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The benefits of  
**PAUA RESEEDING**



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The business of reseeded paua

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# COASTAL WATERS could yield rich rewards

BY KEITH INGRAM

**T**he tide may have at last turned for the struggling New Zealand aquaculture industry with the government's recent acknowledgement of the important contribution this low-profile sector of our marine industry makes to the economy.

In a number of recent addresses, the Minister of Fisheries, Jim Anderton, recognised the industry's efforts to broaden opportunities for New Zealand.

Clearly he has recognised that New Zealand offers one of the best environments for aquaculture in the world. We are an island nation with strong ocean currents from the Southern Ocean, the Tasman Sea and the Pacific Ocean that contain some of the richest nutrients in the world. When we look at the production we are achieving from the limited allocated water space, if the government and local authorities could double this space, the aquaculture industry could more than double its output.

It is acknowledged worldwide that our wild fish stocks will no longer be able to sustain the current demands for seafood at their present levels. Already many previously popular species are no longer available, and many existing species are in serious decline. As our world population grows, discerning consumers are placing greater emphasis on seafood as a quality product for the table. Nothing I've just said is new to any of us.

Clearly, the only way we are going to meet these future demands is by sustainable aquaculture management of both finfish and shellfish.

In his address to the paua industry conference, Anderton highlighted our industry's commitment to reseeding paua in coastal areas to enhance the fishery to meet future demands. He acknowledged the risk of paua theft and the damage that poachers could do in destroying this valuable resource.

He showed his commitment to improving compliance and policing the illegal paua trade routes with the introduction of

two paua sniffer dogs to help officers battle against paua thieves.

Meanwhile, the New Zealand Recreational Fishing Council has called for a ban on the private export of wild-caught paua by non-New Zealand nationals. Recreational fishers have clearly identified that poachers can easily destroy valuable paua reseeding efforts if we don't work together to stop these thieves.

Another interesting potential resource recently came to light over how we can benefit from the settlement of wild puerulus (the larvae of baby crayfish, or rock lobster) on our deep or open-water mussel farms.

These little critters fall from mussel ropes during servicing or harvesting and are washed over the side, where they are either eaten by fish or settle on the muddy bottom and die.

If we harvested these little fellas in a shared fishery project, the industry could on-grow these small rock lobsters to marketable size.

A percentage could be released to reseed or enhance crayfish-depleted habitats of importance to recreational fishing. This could be a win-win situation, and another example where working together in a shared fishery could prove a success.

We need government approval for this to happen, something that hopefully this minister will pick up on and initiate.

In closing, we have to make a final plea to Biosecurity New Zealand. Please, as the country's marine biosecurity controller, do something positive to stop the continuing influx of marine invaders into our local waters.

Stop the arrival of bulk carriers which cannot change their ballast water en route. Stop the arrival of extremely fouled hulls. Let's all take a proactive stance in preventing these illegal aliens from destroying the pristine New Zealand waters we value so highly. The number of recent invaders is too high to list.

There is a message here. We need to act now.



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## BOOST FOR TASMAN OYSTERS

Scientific expertise and local fishing knowledge are both being used to help improve the productivity of Tasman Bay oysters.

Nelson is the second home of the New Zealand native flat oyster, also known as the Bluff or dredge oyster. The quality of the premium oysters gathered in Tasman Bay is high, but recent landing quantities have been described as rather poor.

The scientists from the National Institute of Water and Atmospheric Research have joined with the Challenger Oyster Management Company to develop techniques to enhance the productivity of the fishery.

They are trialing the use of waste scallop, oyster and mussel shells as substrate for oyster spat to settle and grow on, says Russell Mincher of COMC. The results so far have provided vital information about oyster reproductive biology, including when and where oyster larvae are present and available for settlement. "Our experiments have shown significantly increased spat settlement on shell reefs placed on the seabed," says Mincher.

The research will now focus on determining the optimal composition and configuration of shell reefs, and the feasibility of transporting

oyster spat from the wild from spat-catching to ongrowing areas within the industry.

The project is jointly funded by COMC and the Foundation for Research, Science and Technology.

## SEA SQUIRT FOUND ON NELSON VESSEL

Biosecurity New Zealand is investigating the detection of a single adult *Styela clava*, or sea squirt, on the hull of a commercial fishing vessel in Nelson on July 19.

The sea squirt was most likely picked up in Nelson, because the vessel had been berthed there unused for almost nine months, said a senior marine adviser, Brendan Gould. "This raises the possibility that there may be a small population in Nelson," he said.

Biosecurity New Zealand is to survey the area where the vessel was berthed.

## SEALORD TAKES OVER ELAINE BAY

Rob Pooley of Elaine Bay Aquaculture stood down as general manager on June 30 and has sold his shares to the Sealord Group. The two companies have worked together for 17 years. In 1995 Pooley joined a group of growers committed to providing 80 percent of the

mussels required to give Sealord the confidence to grow the business.

In 1996 the two companies formed a joint venture to integrate farm servicing, harvesting, processing and marketing.

EBA will continue to be run as a subsidiary business but will be wholly owned by Sealord. Pooley will continue part-time for at least two years.

## SALMON FARM REFLOATED

NZ King Salmon says it successfully returned its Te Pangu floating farm to its Tory Channel site on June 7 following the mooring slippage in early March.

The investigation into the mishap revealed that a range of factors was involved which caused excessive pressure on one section of moorings. The array of 31 moorings, both block and screw anchors, did not evenly spread the load and this resulted in the failure of some initial mooring lines.

This allowed the farm to skew across the prevailing current, increasing the mooring load with a cantilever effect and resulting in a cascade of mooring line breakages.

Damage and fish losses were largely covered by insurance, but the major loss was in very small fish, only three months in the seawater. Their escape will result in a loss next autumn when they would have reached harvest size, says the company's aquaculture general manager, Stewart Hawthorn.

Some local fishermen may have benefited from the loss, but most of the fish would not have survived the lack of feed and natural predators in the sounds. The company says it has been able to mitigate the fish loss with additional smolt stocks, though the timing of their grow-out is slightly later.

It has insisted on increased redundancy in the mooring system, implemented a single array of screw anchors, and added chain connections to ensure that mooring loads are always evenly distributed.

## WRAP AND VINEGAR TO THE RESCUE

Plastic silage wrapping and household vinegar are helping to successfully control the invasive sea squirt *Didemnum vexillum* (not to be confused with *Styela clava*, another sea squirt species), through the Marlborough Sounds and Golden Bay.

A monitoring dive found that the new technique had killed 98 percent of the sea squirt, and the industry was confident that the Golden Bay infestation would be eradicated.

## KOREAN OYSTERS UPSET RUGBY SUPPORTERS

An outbreak of food poisoning at Eden Park that affected 81 people attending the All Blacks-Ireland rugby test on June 17 is being blamed on contaminated oysters from Korea.

The spectators suffered from vomiting and diarrhoea from the highly infectious norovirus after eating at the hospitality areas of the stadium.

The problem was faecal contamination in the growing waters off Korea, said Callum McCallum, the Chairman of the New Zealand Oyster Growers Association. New Zealand should not be importing this sort of seafood, he said. It was not about trade protection, it was about protecting oyster eaters from becoming violently ill.

The New Zealand oyster industry had measures in place to minimise the risk of contamination, he said. But New Zealand officials said such a move would be draconian and contrary to trade agreements.

### EDITOR'S NOTE

Surely the importers of fresh frozen oysters must meet the same biotoxin requirements our shellfish farms must comply with? And if not, why not? If banning imports is too draconian, these shellfish should be tested here in New Zealand for bio-toxins at the importer's expense.

By doing so, the health authorities and consumers could remain confident that it is safe to eat this imported delicacy. When oysters are served at a function, guests cannot tell the difference and therefore need protection. Why anyone would import shellfish when we have a consistent supply of safe shellfish in New Zealand I don't know, unless it was a price-driven, inferior product, in which case you only get what you pay for. The public and our aquaculture industry should not be exposed to these sorts of risks.



The port project had cost marine farmers between \$25,000 and \$30,000, but was vital if the pest was to be controlled before spring spawning, he said.

A marine biosecurity scientist with Cawthron, Ashley Coutts, said the combination of vinegar and plastic wrapping was effective on high-use structures that could not be removed from the water, such as wharf piles.

A six-week programme to control sea squirt in the Marlborough Sounds began in mid-July. Coutts said its timing was crucial so the squirt could be killed before it spawned in early summer.

## ILLEGAL TRADE DISRUPTED

New Zealand and Australian investigators have uncovered an illegal operation to export 25kg of dried seahorse powder from Australia to New Zealand.



Australian Customs, acting on information supplied by the New Zealand Wildlife Enforcement Group, executed warrants on

businesses in Sydney on June 30 and obtained evidence and other restricted products.

Inquiries indicated that the seahorse powder, declared as being a plant extract, was imported from China in May, and exported within days to New Zealand as part of an import order for use in the manufacture of medicines. Charges are likely to be laid against the Sydney importer. Investigations in New Zealand are continuing.

## KINA THRIVE ON SPECIAL DIET

A joint project between NIWA and Sea Urchin New Zealand could lead to much higher returns for commercial kina, or sea urchins.

Roe yields in wild-caught kina have been consistently doubled by feeding them a protein-rich diet that NIWA has developed. The kina are held in land-based cages or sea cages, and are finished with their natural kelp food.

Commercial-scale sea trials in the Marlborough Sounds showed that the switch from land-based to sea-based operations hugely reduced infrastructure costs, and reduced labour and feeding costs by about 80 percent.

## INTENSE FISHING MAY DRIVE OUT PESTS

Populations of invasive species can sometimes take a natural downturn, and scientists at the National Institute of Water and Atmospheric Research have developed a population model to determine if selective fishing can hasten their demise. They based the model on the invasive crab *Charybdis japonica* in the Waitemata Harbour.

The model was based on catch data from eight trapping surveys NIWA and Biosecurity New Zealand carried out between 2002 and 2004. It incorporated the effects of variation in sea surface temperature on larval survival and post-settlement mortality of the crab population.

Forecasts of crab numbers over 25 years suggested a high probability of extinction in six to eight years, and that intense fishing could accelerate the process. More accurate estimates of crab recruitment and growth are needed to calculate the fishing pressure (and investment) required to have an impact.

## SCOTTISH SALMON FARM JOBS GO

About 1500 production and processing jobs have been lost in salmon farming in Scotland since 2002, following the dominance of the industry by foreign-owned companies, the Scottish Executive said on June 15.

"In 2001-02 it was estimated that the production and processing of salmon generated about 10,000 jobs in Scotland," said Paul Haddon of the SE's Marine Group. "The latest figures currently available are for 2004, when it was estimated that the equivalent figure was about 8500 jobs."

Since 2004, fish processing plants and a number of fish farms and smolt-rearing facilities had closed in Scotland, Shetland and the Outer Hebrides. Scotland's largest fish farmers, Marine Harvest and Stolt, had amalgamated and been taken over by the Norwegian multi-national company Pan Fish.

Pan Fish also had a controlling interest in Fjord Salmon. If approved, the new group would give Pan Fish over 65 percent control of Scottish salmon farming.

See [www.salmonfarmmonitor.org](http://www.salmonfarmmonitor.org)

## PROFIT BOOST FOLLOWS SLUMP

South Australia's tuna farmers are expecting a A\$60 million increase in their industry this year following a two-year slump.

The reasons include less tuna from other sources, strengthening Japanese demand, and processing of about five percent of tuna product at Port Lincoln, rather than the

harvest being entirely processed in Japan.

Sources said Australia expected to sell about \$200 million of tuna in Japan this year, increasing to \$500 million by 2016.

## ABALONE HARVEST DUE SOON

The Australian Bight Abalone company says it plans to produce its first abalone early in 2007, says the chief executive, Andrew Ferguson.

The original goal was to have supplies ready for the Beijing Olympic Games in 2008, but good growth rates and low mortalities had brought the project forward.

The company has been awarded two new aquaculture leases near Elliston, and plans to invest A\$100 million in the west of South Australia, on top of the \$10 million it has already spent to develop sea-based abalone farms.

Patents are pending on the technology the company uses to farm green lip abalone in sea cages. Ferguson says Australian Bight has 35 farms and will operate more.

## MARINE FARM WAITS FOR GREEN LIGHT

The first major marine farm development on the West Coast of the South Island looks likely to receive a green light.

The 45.5ha farm is located about 11 km off the coast of Jackson Bay.

The Ministry of Fisheries says it has formed the preliminary view that the proposed farm will not have an unduly adverse effect on fishing or the sustainability of fisheries resources in the area. Submissions closed on July 3.





# PAUA RESEEDING – the business beneath the surface

BY ELLIE WATTS, CAWTHRON INSTITUTE



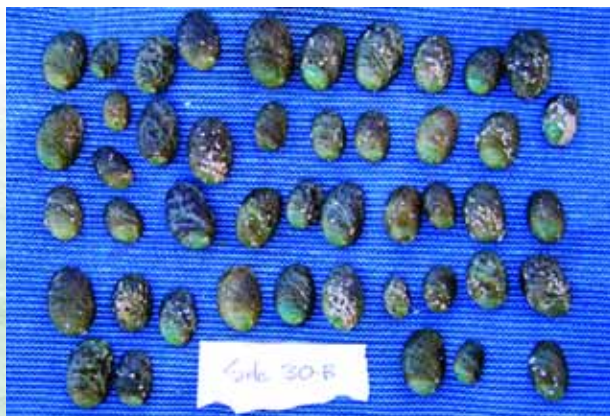
Pearl net pack with hatchery paua on the sea floor, ready for release

In the past few years, the production of paua seed has become routine for several hatcheries in New Zealand. Most of this seed (about a year old) is on-grown on farms, but some of it has recently been used to test the feasibility of

reseeding as a means of enhancing the paua fishery. The combination of aquaculture and wild fishery may well play a key role in the future management of the precious paua resource.



Seeded paua after 16 months in the wild. The blue shell indicates growth while in the hatchery



In 2005, Rodney Roberts of the Cawthron Institute, along with PauMac 4's representative, Allan Culverwell, spent nine days scouring the Chatham Islands' coastline to inspect 70 sites for reseeding potential. These sites needed to meet very strict habitat criteria before any juveniles were released. Boulders had to be large enough to remain stable during storms but small enough so research divers could turn them over. Suitable sites were also required to display healthy juvenile paua communities but not be overpopulated.

A total of 27,000 juvenile paua, spawned from Chatham adults and reared at OceaNZ Blue's facilities in Bream Bay, were reseeded during this period throughout 12 sites. A sample of these juveniles was sacrificed for disease testing before the Ministry of Fisheries gave the "all clear" for them to be released into the wild.

During a four-day weather window in June, Nigel Keeley and I met up with Allan Culverwell on the Chathams to revisit these sites for growth and survival assessment, and to reseed a further 12,000 juveniles.

Paua reseeding is anything but a whimsical scattering of juveniles from the deck of a boat, and when isolated places such as the Chathams are involved, the logistics can be tricky.

Handfuls of juvenile paua were quickly and carefully settled into empty adult paua shells. Several shells were packed side by side into 0.25m<sup>2</sup> mesh "pearl nets" supported by wire frames





LEFT: Paua juveniles in an adult shell, ready for reseeding  
 RIGHT: Diver introducing hatchery paua to their new homes in the sea

so the paua did not suffocate each other during their night's recovery in an onshore holding tank.

The following two days were spent covering miles of coastline by boat while divers bailed over the side in search of hundreds of new homes, precious cargo in hand. Accurate position-fixing equipment and detailed site descriptions were critical at this stage to ensure the sites could be relocated to gauge the level of success.

Once an appropriate site has been identified, "seeding" the paua out is relatively efficient but not without hassles. Paua have a peculiar habit of emitting lots of mucous when stressed, for example by handling out of water.

As a consequence, they often temporarily lose their foothold after re-immersion in water. The mucous immediately attracts predators. Cod have a penchant for anything out of the ordinary and can pose as a pain in the fingers, lips or cheeks with their "rotary hoe" style of biting.

It can be quite distracting to be surrounded by half a dozen of these bandits while trying to place 20 or so juvenile paua into safety under a suitable boulder.

Although the weather was kind enough to allow the second reseeding phase to proceed, a persistent 3m southerly swell kept the results of the back coast's previous reseeding trial locked up.

Three other sites from the 2005 trial were accessed, however, and the initial results showed promise, with growth rates averaging 30mm to 46mm over 16 months.

The Marlborough Sounds is also producing encouraging results three years after the start of a reseeding experiment. Under the watchful eyes of PauMac 7 representatives and Cawthron scientists, approximately 100,000 seeds were released. Intensive follow-up surveys have recorded growth rates averaging 25mm to 30mm per year, and survival estimates ranging from 16 percent to 36 percent.

The signs are encouraging, and reseeding used as a fisheries enhancement tool is beginning to turn heads throughout New Zealand. Reseeding workshops, discussions and presentations are becoming almost commonplace at paua fishery management and farmers' meetings.

PauMac representatives, farmers, scientists and MFish are currently discussing safe and sensible approaches to large-scale reseeding projects, so this management tool has the opportunity to play a constructive and perhaps major role in securing our paua fisheries for generations to come.



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# AMA OPPORTUNITIES in the Bay of Plenty

The November 2001 aquaculture moratorium was the start of a major overhaul of aquaculture legislation. It included significant changes to regional councils' role in planning for and managing aquaculture.

Probably the most significant change for regional councils was the introduction of the concept of aquaculture management areas. Previously, resource consent applications for aquaculture could be made nearly anywhere within a region's coastal waters.

Regional councils are now forced to strategically plan for aquaculture if they want to provide for it. Though the reforms did not take effect until January 2005, a number of regional councils were keen to start the ball rolling in exploring opportunities for AMAs.

This included Environment Bay of Plenty, which decided early on that was it was keen to provide for aquaculture. The only aquaculture in Bay of Plenty waters was three small oyster farms in Ohiwa Harbour. However, just before the November 2001 moratorium we received applications for two large mussel farms of 4750ha off Opotiki and 4009ha off Otamarakau (about half way between Whakatane and Tauranga).



FIGURE 1



FIGURE 2 The Opotiki and Otamarakau mussel farm applications

These applications kindled the council's interest, as it recognised the significant regional benefits these farms could bring to the Bay of Plenty, especially the economically depressed eastern part. And so we were keen to explore the AMA concept and how more aquaculture could be encouraged in the region.

Our "AMA Project" began in early 2002 after we secured funding from the Ministry of Economic Development. The project's goal is to identify opportunities for AMAs in the Bay of Plenty and is made up of two parts, the coastal use and value maps, and the offshore science project.

The maps show all the uses and values of the region's offshore environment that may limit where aquaculture can take place. For example, we don't want to situate aquaculture in a commercial shipping lane.

The first task was to pull together existing information from in-house sources such as existing resource consents and the coastal plan, and externally from the Coastguard, the Ministry of Fisheries and the Department of Conservation.

We also commissioned consultants, held hui with Maori and carried out our own studies where there was little or no existing information (eg marine mammals, culturally significant sites to Maori and charterboat routes).

Draft maps were taken out to the community for consultation from November 2005 to February 2006. The consultation process was an opportunity to check to see if what was shown on the maps was correct and if anything was missing. As a result, a number of changes and additions were identified. The maps are nearly finished and should be released by October.

It's important to note that the coastal use and value maps are not "constraints maps". We have not tried to set levels of constraint for the different uses and values. There are some uses and values, for example commercial shipping lanes, where any type of aquaculture would not be possible.

However, for other uses and values, the level of constraint can vary depending on the type of aquaculture,

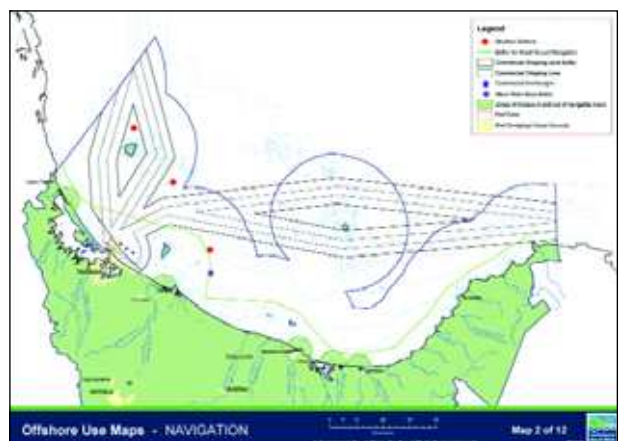


FIGURE 3 Map two of 12 taken out for consultation between November 2005 and March 2006





FIGURE 4 The underwater video survey positions recorded during the Bay of Plenty seabed survey

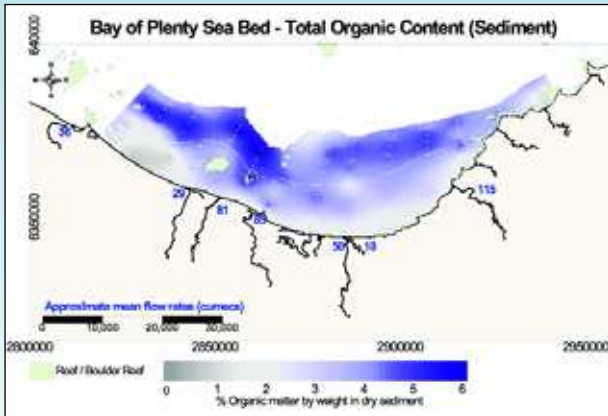


FIGURE 5 Organic content of sediment in the grab samples

eg a submerged mussel farm might be acceptable within sight of the coast.

## OFFSHORE SCIENCE PROJECT

We want to make robust decisions about where AMAs might be located. To do this we needed good science to understand the coastal environment and how aquaculture may impact on it. It has been a two-stage process - a data gathering phase, followed by running models developed by ASR Ltd.

Data was gathered for

- physical and chemical characteristics of the water
- chlorophyll-a (ie plankton) concentrations
- current and temperature profiling of the water column
- benthic organisms, and
- sediment characteristics.

Much of the data was obtained through field surveys from mid-2003 through to 2004. The surveys included the use of a current meter, underwater video and sediment grabs.

The data was then used to calibrate models from the 3DD Suite (© Black, 2001) to simulate currents, plankton concentrations, water temperature and nutrient cycling.

One of the scenarios being run is the simulation of the depletion of phytoplankton and zooplankton at two and four large mussel farms of approximately 5000ha each at different locations on the inner shelf of the central Bay of Plenty. Other scenarios include looking at how El Niño and La Niña climate variables can influence phytoplankton levels.

Most of the reports on the field surveys are available on our website. The reports on the models and the scenario output should be finished by October.

Once the coastal use and value maps and the offshore science project are finished, the next step will be to figure out the best places for AMAs. The industry has given us a clear

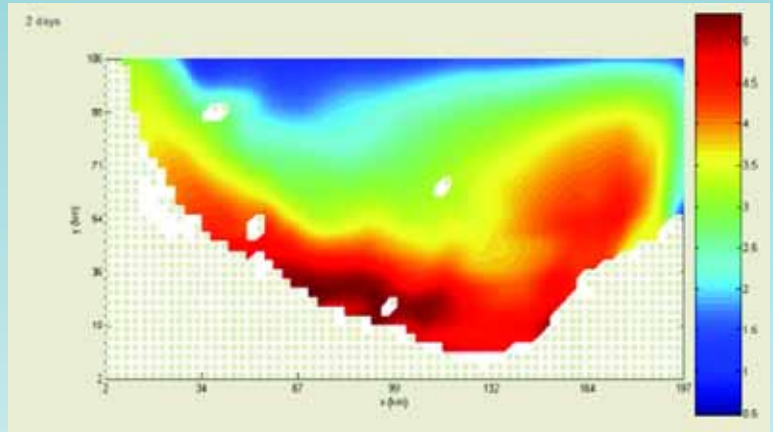


FIGURE 6 Modelled yearly averaged phytoplankton chlorophyll-a ( $\text{mg}/\text{m}^3$ ) at a water depth of 15m within the Bay of Plenty without a mussel farm

message that they need to have input into where AMAs should be located. No-one wants us to create an AMA, only to find out that it's not commercially viable because of its location.

So far there has been very little specific interest in aquaculture in the Bay of Plenty, other than the two mussel farm applications. We're keen to look at how we can provide for future aquaculture technologies such as open-ocean sea cage farming. Although they may not be a commercial reality for New Zealand at present, we want to be ready and have space available when they do.

One of the ways we'll engage with the aquaculture industry is at a workshop we're holding in October where we will present the information from the AMA project and possible opportunities for AMAs. All going well, we will decide in December where and how to provide for AMA opportunities.

The current statutory processes mean that it may take up another four years for any new AMA space to be available. The council wants to plan now to ensure that the aquaculture industry can respond quickly to new technology and markets in the future. But we need the industry's help to guide us.

For more information about Environment Bay of Plenty's AMA Project, or to go on our mailing list, contact Ben Lee, phone 0800 368 267, email [Ben.Lee@envbop.govt.nz](mailto:Ben.Lee@envbop.govt.nz)

For further information about the science project, contact Stephen Park, phone 0800 368 267 email [Stephen.Park@envbop.govt.nz](mailto:Stephen.Park@envbop.govt.nz)

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# From shellshocked to “WORLD’S BEST”

BY REG BREAKWELL



**W**allis Lake is one of Australia’s most picturesque and popular seaside holiday resorts. It is located in New South Wales on the eastern coast of Australia approximately 300km north of Sydney. The Wallis Lake system, with its permanent opening to the sea, comprises approximately 73sq km of marine-dominated tidal waterways, including some 31sq km of seagrass beds.

Wallis Lake has a history of commercial oyster production reaching back over 100 years, and is one of the largest of the 32 commercial oyster-producing estuaries in New South Wales. In 1997, the local oyster industry was brought to its knees when a number of people became ill after consuming locally harvested oysters.

The statutory oyster harvest closure and the negative publicity that followed had a significant financial impact on the local oyster and tourism industries, and it was a bitter pill for a

coastal community that prided itself on its pristine water quality.

Remedial action was swift, and the Wallis Lake event is now regarded as a catalyst for fast-tracking the implementation of the New South Wales Shellfish Programme, one of the world’s most stringent and rigorously enforced public health safety shellfish harvest programmes. This statutory programme applies to all oyster harvesting areas in New South Wales and is managed by the New South Wales Food Authority.

The Wallis Lake oyster industry is now back as one of the leading producers of the Sydney rock oyster (*Saccostrea glomerata*), a native of the eastern coast of Australia and arguably one of the best in the world to eat raw. The Wallis Lake industry injects around \$11 million annually into the local economy, and markets its product with confidence.

An exceptional relationship is said to exist at the lake between the oyster industry and the local community. It extends from the provision of employment and business opportunities to close cooperation to ensure the protection of the local environment.

“Given the economic, social/cultural and environmental significance of the oyster industry in Wallis Lake, the Great Lakes Council and local oyster growers have established and maintained strong working partnerships,” says the mayor of the Great Lakes Council, John Chadban.

This partnership is based on the over-riding objective of ensuring that oyster production in the lake is managed in perpetuity in a sustainable manner. Oyster growers are strongly and consistently represented in the Wallis Lake Estuary Management Plan, where they work with the council, agency staff, other industry representatives and the community to implement the management plan and sustainably manage and protect the lake.

The first objective of the plan, “to ensure that oyster aquaculture leases operate in a sustainable manner”, outlines nine specific actions to achieve this, including support for phasing out tar-based oyster-growing products.

“The council and the oyster growers have a strong platform to work together to manage and protect Wallis Lake and its oyster industry,” says Chadban.

## PLASTIC UNITS REPLACE TIMBER AND MESH

The Australian aquaculture industry service company Tooltech produces the Aquatray and Aquapurse shellfish grow-out systems under the Ploma brand name.

Tootech’s marketing and export manager, Reg Breakwell, says his company has established a rapport with almost all the aquaculture farmers around Wallis Lake, and they make full use of the company’s products in their shellfish grow-out systems.

Tooltech’s environmentally friendly polymer 910mm standard Aquatray, the XL6 Aquatray and the XL8 (at 2.4m x 910mm it is perhaps the largest oyster grow-out shellfish tray anywhere) and all versions of the Aquapurse are used in both inter-tidal and sub-tidal modes.

Because of their design, the units lend themselves to diverse methods of use, and other framing methods are being trialed. The Aquatray and Aquapurse are rapidly replacing the many thousands of timber and mesh trays that have been used for several generations, Breakwell said.

The Aquapurse wave barrier was first used in Wallis Lake. It acts as an economical, predator-proof grow-out cage, and also protects oyster farms from excessive boat traffic wash. (Reported in FFI August 2005.)



# BILLION DOLLAR goal for aquaculture

**A**quaculture aims to become a sustainable \$1 billion industry by 2025, according to goals set out in the New Zealand Aquaculture Strategy announced on July 31.

The strategy would provide a strong foundation for growing the sector and contribute to New Zealand's economic transformation, the Minister for Economic Development, Trevor Mallard and the Minister of Fisheries, Jim Anderton said at the launch of the strategy.

The strategy had to be market-driven and commercially viable. It also required:

- the collective action of the industry
- growth to be driven by innovations in existing and new space, species, products and markets
- growth to take place within an environmentally sustainable framework, and that the
- strategy be implemented by partnerships between the industry and the government, communities, iwi, regions and research and education providers.

A key challenge in recognising the potential of aquaculture was to add value, based on increased productivity, rather than simply increasing output, Mallard said. The industry currently generates \$333 million of revenue, mainly from Greenshell mussels, (\$209 million market value), chinook salmon (\$88 million) and Pacific oysters (\$28 million). The industry makes up about 15 percent of New Zealand's seafood exports by value.

The average value of New Zealand's aquaculture is \$3 per kilo, compared with \$20 per kilo in Australia, where there was more focus on high-value finfish such as kingfish and shellfish.

"In 20 years time, the future of New Zealand's aquaculture industry will look very different to that of today," Mallard said.

The strategy includes a 10-point plan that sets out the key actions required to boost the sector so that it meets its goal.

A major part of the plan is to establish a new national organisation, New Zealand Aquaculture Limited, by amalgamating the existing New Zealand Aquaculture Council and the species groups, iwi, and other commercial aquaculture participants.

The other points in the plan are to:

- strengthen the partnership with government
- strengthen other stakeholder partnerships
- secure and promote investment in aquaculture
- improve public understanding and support for aquaculture
- promote Maori success in aquaculture
- develop markets for New Zealand aquaculture products
- maximise opportunities for innovation
- promote environmental sustainability and integrity, and
- invest in training, education and workforce promotion.

The government was working to build a strong relationship with the sector, and was establishing an aquaculture ministers' group and a chief executives' steering group.

"The launch of this aquaculture strategy is the first step down a new path," said Mallard. "The success of this strategy will ultimately depend on the level of commitment from key players. We must all take responsibility for accelerating our efforts to

develop an innovative and sustainable aquaculture sector."

The government was also firmly committed to undertaking a range of practical projects in partnership with the industry, he said. "These projects will occur over the next 18 months, and will be targeted at specific areas where accelerated progress can demonstrate some real benefits to the industry and the New Zealand public."

The chairman of the New Zealand Aquaculture Council, Callum McCallum, said New Zealand was in a great position to be a major part of "this food producing revolution." By 2025 aquaculture would be on the same footing as the New Zealand wine industry, and by 2030 it would match the wild fisheries catch, McCallum said.

New Zealand's aquaculture products already had a great reputation at home and abroad. Along with the "flagship" species of Greenshell mussels, chinook salmon and Pacific oysters, abalone was a new and upcoming species, and a number of others were waiting to be realised commercially, he said.

"Aquaculture ... will also help rejuvenate regional New Zealand, with opportunities for employment and service industries. Iwi will also benefit from this growth, as their future position in aquaculture is an important component to our success."



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# Danish technology behind **KINGFISH FARM FAILURE**

BY KEITH INGRAM

**W**e read in the Northern Advocate on June 8 that a kingfish farm set up by Maori in the Far North two years ago was folding, with debts of \$7.6 million.

The Parengarenga fish farm was closing down its operations it established by Parengarenga Harbour, citing financial troubles and constant problems with its land-based aquaculture plant.

The shareholders had been advised of difficulties with the farm on several occasions, but the closure caught many of the 2500 shareholders by surprise. Until recently, the fish farm, a Parengarenga Incorporation subsidiary, had been hailed as a prime example of Maori economic development in the north.

The chairman, Winiata Brown, of Te Kao, told shareholders that the plant, built by Inter Aqua Advance Aps (IAA) of Denmark, had design faults and was not meeting production expectations, with its ongoing costs being exorbitant.

He advised that legal action against IAA had to be taken in Denmark under their legal jurisdiction. "We simply do not have the resources to initiate or maintain such action."

At their shareholder meeting on June 9, the company directors confirmed that the Parengarenga Incorporation would sustain the outstanding loan of \$7.6 million, and that all creditors would be paid.

Brown said it was unfortunate that the fish farm would have to shut down its operations to effect significant repairs to the plant. IAA had claimed its aquaculture plant would produce 600 tonnes of fish annually, but now conceded that it would produce only up to 400 tonnes, he said.

Faced with the option of selling some 50 tonnes of kingfish at discounted prices, for crayfish (lobster) bait, or even having to bury them, so that the plant could be closed, the Kingfish Go Wild consortium, led by the New Zealand Recreational Fishing Council and its sponsors, stepped in and offered to buy the fish for release into the wild.

Kingfish Go Wild achieved two direct aims - the release of suitable kingfish into the wild from the far north to Raglan, and the publicity surrounding the campaign created additional markets where the larger kingfish could be sold at higher prices.

In effect, the additional money from the sale of the fish by both Kingfish Go Wild and retail markets enabled the farm to stay open for a few weeks longer, and gave the operation additional money to fund staff during the shutdown and clean-up

process, said the farm manager, John Ellis.

"It has been a pleasure to work with the recreational fishing community in seeking a worthwhile outcome for what was an

unpleasant problem," Ellis said.

One of the major design faults was that sections of the farm could not be isolated for repairs and maintenance. Other design features as specified by IAA were starting to cause significant problems within the farm.

It soon became apparent that to effect major repairs to pumps and equipment and the concrete raceways, the kingfish had to be removed and the farm drained.

In essence, the media interest created by Kingfish Go Wild to tag, transport and release kingfish throughout the north assisted the farm greatly. The balance of the fish was sold to Europe, various wholesalers, retailers and fishermen. The mammoth task of cleaning the fish farm is now underway, with the staff waterblasting the entire wet area, and flushing, rinsing and oiling all its machinery.

The repairs will also include replacing and fitting two state-of-the-art compressors supplied by Air Products Ltd of the United States. Air Products recognised the constant problems the farm suffered with the original IAA-specified compressors, and agreed to replace these at no additional cost, Ellis said.

So what did go wrong? Was it just some chronic design faults by the Danish company, IAA, and that their recommended systems could not produce and live up to expectations?

## **Aquaculture consultant Barry Torkington toured the farm with John Ellis, and made the following, independent comments:**

The venture has failed primarily because of very poor equipment performance resulting in low harvests in the first few years, and burning the cash reserves. Doubts remain as to the long-term viability due to the high operating costs of the plant in its current form.

The farm is a 32-concrete raceway sharing a common water treatment and delivery system. Hence the first problem, as no raceway could be isolated for repairs or maintenance.

The water treatment system is substandard. Oxygen was generated on the site and compressed for high-pressure injection and automatic feeders fed each raceway twice a day with a measured rate for the number of fish.

He identified the systems' failures as being every piece of equipment has proven to be unreliable and failed, incorrectly sized or very expensive to operate, and often all three were true.

There was no system for removing suspended solids under 65 microns, which typically contribute almost an equal bio-load on the filtration system as the fish being cultured.

The two most serious design deficiencies were in animal management and the lack of redundancy. The first prevented easy grading and treatment processes without incurring large losses from injury and stress. Inconsistent growth rates resulted in mixed fish sizes. There were no proper raceways to allow fish





to swim to and from a sedation centre for regular grading and utilising selected harvest techniques.

The entire system's water treatment capacity was shared by two or three pieces of equipment, exposing the stock to huge risk in the event of a mechanical failure.

Any intense recirculating aquaculture RAS system needs a minimum of 50 percent redundancy for each treatment process, with modules designed to be easily brought on line or isolated for maintenance.

"The equipment configuration as supplied by IAA on the farm was a disaster waiting to happen, as it would only be a matter of time before a system failure halved the holding capacity and allowed only a few hours to harvest hundreds of tonnes of fish, which is simply not possible," Torkington said.

Why was alternative advice not sought from the outset? Or did the Danes do such a good selling job that the corporation took their word and recommendations as gospel.

One has to ask, what experience had IAA in farming kingfish? Or was the equipment adapted from northern hemisphere eel farming techniques, where they obviously have the expertise.

The sad part is that since commissioning and operating the farm, the corporation has endeavoured to do everything correctly, including meeting its creditors' financial commitments.

Meanwhile, the Danish company hides behind the Danish legal system, and can walk away. Is this fair?

Should they not be contributing to the significant repairs and alterations that have to be carried out to make this farm financially viable in the future, whether it is still owned by the Parengarenga Incorporation or a private investor?

The farm is obviously too good to just let it go to waste and ruin. Aquaculture and fish farming in particular has huge potential for creating much-needed employment and income for the Far North.

Torkington advises that the whole configuration of the site needs to change so that:

- the 32 raceways are divided into eight systems can be easily isolated
- the water treatment station needs to be completely rebuilt to provide for division of the raceways, and the existing two solids filters need removing and replacing with eight smaller units
- eight foam fractionators need to be installed with sufficient capacity to treat the total flow of the four raceway modules at full load,
- the present system for generating and injecting oxygen is extremely expensive, and becomes prohibitive when correct levels of redundancy are included. A new system of a much larger footprint capable of being divided by eight, and less liable to fail, needs to be developed.

If that was not bad enough, Torkington is just as critical of other aspects:

- The feed storage and delivery system was, "a disaster, and probably beyond redemption." A much simpler system using gravity and Kiwi ingenuity might be possible.
- There did not appear to be a robust and efficient way to control the temperature to the optimum level required for intensive RAS systems.
- The bio-reactors were "somewhat" archaic, and did not have any redundancy or flexibility, whereas inexpensive and very

effective treatment units could be built on the site.

If the IAA is such a world leader in aquaculture farm management and equipment, how come they are selling what has now been described as "obsolete, archaic and unsuitable equipment to farm kingfish down under?"

We understand that it is not possible to resurrect this plant for growing out kingfish without substantially rebuilding the filtration system, the raceway, water return and water inlet systems, as well as installing an efficient oxygenation and feeding system.

Ignoring the legal issues, let's focus on the moral issue of doing what's right for your client. Is IAA justified in ignoring a problem when it supplied the technical and professional advice and equipment to the farm, and then promoted it as a success on their own web site. Here we have a plant that has failed in two years when one would expect 10 to 15 years before a major overhaul. Should IAA not be taking a proactive role in putting things right for the client? Or is just another example of the way IAA does business in the northern hemisphere? Should IAA have first sought advice on whether their system was in fact suitable for on-growing kingfish in the first place!

The big question remains. Will they now do whatever it takes to put things right and rectify their faults, rather than passing the buck?

We are told that all the technical and professional expertise is readily available in the South Pacific. After all, who was it that developed the ability to farm kingfish as a prime aquaculture species? Kiwis, of course!



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# A PERSPECTIVE on the maritime environment and marine farming

BY DR ANDREW MORGAN



Sumner Head and the entrance to Lyttelton Harbour, where marine farming exists in sheltered areas



Sheltered Akaroa Harbour on Banks Peninsula, where some marine farming exists

**F**ew areas play host to marine farming along a large and varied coastline. Marine farming has sprung up where healthy production of quality seafood products can be supported. In addition, this tends to be along relatively sheltered parts of the coast.

Traditionally, agricultural communities have pre-existed in these areas. Compared with densely populated parts, these coastal rural settlements also have heavily developed agriculture. Other, more semi-pristine sites, are holiday-type residences or “lifestyle” blocks. Out of necessity, most marine farming has developed there, as they accessible and economically viable to operate in. Consequently, a conflict of interest exists between landowners and water space users along the coast.

Marine farming could be achieved in more isolated parts of the coast, but these are relatively inaccessible or are exposed. A vast number of geographically isolated areas exist that are more inaccessible to humans and their needs. So there are limitations on the locations that can be used for marine farming.

In terms of conservation, this leaves a huge amount of coastline that is relatively pristine. Despite this, a mindset has been cultivated that results in a “not in my backyard” attitude by land users who have already modified the surrounding

environment anyway. Trying to pitch the conservation approach has been proved inadequate as a credible method for “the back doorstep objection” time and time again.

The power generation industry is experiencing similar problems. Everyone wants it, but no-one wants to look at it or take responsibility and accept its effects.

Relatively few New Zealanders fully appreciate how extensive our coastline is and how little space marine farming occupies. From Stewart Island north to Dunedin, on to Banks Peninsula and the Kaikoura Coast, the rugged, mountainous coastline remains relatively untouched.

Across Cook Strait, journeying past Cape Palliser and Castlepoint, the sweeping landscape moves north to East Cape. Around to the Bay of Plenty and on to the Mercury Islands, then the Coromandel and northern New Zealand, many hundreds of kilometres of rugged, isolated coastline teem with marine life. And this is just the eastern coast.

A perceived illusion or misconception about what is going on with marine farming, and subsequent misinformation, may be deluding adjacent land users and the public. Where marine farming is being carried out, pre-existing land use by its very nature has already resulted in modifying part or all these areas and the adjacent coast visually, structurally and ecologically.

Everyone wants easy access to areas of marine coastline that are useful. How is it then that with such a vast amount of nearly pristine coastline there can be such a constraint on the development of a marine farming industry with such huge potential?

For some species, marine farming could be pushed further offshore, as is being tried with mussel farming. However, all the issues that arise for coastal marine farming become someone else’s problem. “Out of sight, out of mind,” might be the attitude when trying to send the industry down this path. As a nation, New Zealand is no better or worse off, as other people inherit associated problems with conflicting use.

New Zealand’s geographic isolation means the country relies heavily on merchant shipping for importing and exporting

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The beautiful Kaikoura coast during heavy seas and cold southerlies in winter



The isolated and exposed Cape Palliser coming north from Cook Strait on a fine winter's day

products. Furthermore, the long coastline supports a thriving fishing and tourism industry. So equally, rights to use of the offshore water column and seafloor are just as problematic as the use of inshore waters and its conflict with land use.

Whether inshore or offshore, different groups of people are affected by marine farming. Other industries were impacting these environments long before marine farming. In the end, the public has to be convinced about the benefits of a much larger marine farming industry for New Zealand.

Marine farming is traditionally a labour-intensive, low-skill industry that cannot support a large number of high-end jobs in research and technology development. At its present size, key people who are highly trained in marine-based research and development go overseas, or work outside their field. Yet ultimately it is high-end research and technology development such as the Cawthron Institute carries out in partnership with

industry that will improve and expand aquaculture and cement its sustainable long-term future.

Our duty and obligation as keepers of the maritime environment is to show the public that marine farming represents a huge future for New Zealand. The ocean is there for our use; most of the coastline is still semi-pristine. A huge, unexplored and unexploited coastline and an exclusive economic zone exists.

A much bigger picture is at stake in being able to protect and exploit our marine resources and maritime environment at a national and international level for our own use now and into the future. Education to change public perception for a traditional, agriculturally based nation, and further integration of our maritime industry, is the key to unlocking our maritime future and the significant role marine farming will play.



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