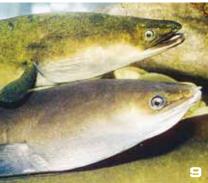
new zealand aduaculture

IRELAND BUYS KIWI PERCH TECHNOLOGY

Cawthron monitors seafood safety

Volunteers assist blue cod research







- **EDITORIAL**
- **NEWS** A look at what's happening in the industry
- 5 AQUACULTURE MEANS A+ FOOD Aquaculture crucial in providing nutritious food
- 6 BLUE COD SUSTAINABILITY: enhancement and aquaculture Marlborough students help conserve fishery
- HAWKESBURY FARMERS REFUSED TO BE BROKEN 7 New South Wales farmers overcome QX disease outbreak
- 8 OCEAN LAW - Coastal occupation charges Marine farmers escape additional charges, but not for long
- HEALTH-RELATED TRADE BARRIERS 9 LITTLE RISK FOR NZ EELS Most of our eel pathogens are already found overseas
- 10 ACROSS THE DITCH: consumers want confidence Discerning customers seek value, not price
- 11 PERCH EGGS SENT TO IRELAND (or is that coals to Newcastle?) Ireland could import our eggs and double production
- 12 ENSURING MARKET ACCESS FOR SEAFOOD PRODUCTS Research is vital to protect our premium quality status
- 14 A PIONEER OF MURRAY COD One man's dedication to the big fish of the Murray River





ISSN 1176-5402 ISSN 1176-8657 (web)

An informative journal for the aquaculture industry

Published by:
VIP PUBLICATIONS LTD 4 Prince Regent Drive, Half Moon Bay, Manukau 2012 Ph 09 533 4336 Fax 09 533 4337 Email keith@skipper.co.nz advertising@skipper.co.nz or stephanie@skipper.co.nz www.nzaquaculture.co.nz

EDITOR: Keith Ingram

ASSISTANT EDITOR:

Mark Barratt-Boyes

CONTRIBUTORS:

Reg Breakwell, David Cooper, Justine Inns, Henry Kaspar, Dorothy-Jean McCoubrey, Dr Andrew Morgan, John Mosig, Danette Olsen, Steve Webb

MANAGER: Vivienne Ingram

ADVERTISING:

Hamish Stewart

Stephanie Railey, mob 021 954 241 **DESIGNER:** Rachel Walker

PRE PRESS/CTP: BPG Digital

PRINTERS: GEON BPG

DISTRIBUTION: By subscription

General: Reproduction of articles and materials published in New Zealand Aquaculture in whole or part, is permitted provided the source and author(s) are acknowledged. However, all photographic material is copyright and written permission to reproduce in any shape or form is required. Contributions of a nature relevant to the aquaculture industry are welcomed and industry participants are especially encouraged to contribute. Articles and information printed in New Zealand Aquaculture do not necessarily reflect the opinions or formal position or the publishers unless otherwise indicated. All material published in New Zealand Aquaculture is done so with all due care as regards to accuracy and factual content, however, the publishers cannot accept responsibility for any errors and omissions which may occur. New Zealand Aquaculture is produced bi-monthly.

IT'S TIME FOR POLITICIANS TO COMMIT

he old saying, "Talk is cheap", has never been truer than what the aquaculture industry is constantly addressing.

As we look around the coast it's been an interesting time for dedicated marine farmers who constantly put their business development and family lives on hold while they wait for bureaucratic and political decisions to be made.

No other industry in New Zealand has to face the wideranging interference of some 15 different agencies that have an interest in the sea and the areas where our marine farmers work. Yet they turn the other cheek and continue to make the most of the opportunities in a business-as-usual approach to life.

The umbrella organisation, Aquaculture New Zealand, got off to a flash, chest-beating start, only to withdraw into a quiet whimper as the new board and management tried to address the many and varied issues facing the industry. The level of silence from Aquaculture NZ is allowing local authorities to continue with entrenched bad habits, and let our central politicians government politicians off the hook. Your industry is watching and waiting.

The development of new aquaculture management areas is frustratingly slow, and has even stalled and in some cases gone backwards as local authorities become nervous about making any meaningful decisions for fear of commitment, and the costs falling on local ratepayers. And Fisheries Minister Jim Anderton walks the walk and talks the talk, only to find that his Cabinet colleagues are not picking up on the message.

While aquaculture development stagnates, we continue to see uncontrolled urban and agriculture runoffs into our local marine waters, which is having a significant effect on degrading our marine biodiversity. And little is being done about it.

Yet we hear environmental supporters talk of how these horrible marine farmers are degrading our environment through visual impacts, destroying plankton flows and degrading the seabed. In the same breath, we hear of the continued drive by the government and its environmental supporters in a recent discussion paper to lock up yet another 429 new marine protected areas to protect biodiversity and unique habitats. Yet nowhere in the strategy is there any suggestion of management tools or penalties on local authorities that cannot control urban runoff, never mind

the continued destructive raw sewage discharges.

And just when you've got your head around this dimension, we have environmental folks wanting to lock up huge tracts of our coastline for dolphin protection.

Well, I'm confused. On the one hand we are locking up huge parts of our coastline as marine protected areas or dolphin-protected habitat, while on the other we continue to pour out untreated, destructive chemicals, sewage and other urban waste, all of which have a collective, destructive effect on our nearshore marine biodiversity.

If this isn't getting our priorities all wrong, I don't know what is. Yet when it comes to feeding our nation, the politicians remain silent. Our current level of commercial fishery extraction is clearly unsustainable. This is confirmed by the continuing number of cuts we are seeing to the total allowable commercial catch across most fisheries. Clearly, the future of sustainable seafood production and harvesting lies in healthy, marine farms and aquaculture for both shellfish and finfish.

It's acknowledged worldwide that 48 percent of seafood available to consumers currently comes from aquaculture, yet our politicians pay limited lip service to this industry.

It's time to turn up the heat. We can sit back and continue to watch our young, educated marine farmers and New Zealand-developed technology drift offshore to countries that are holding out the welcoming mat. Or we can do something about it.

It's time for the industry to become political. It is time to lobby all politicians with positive facts that support the national economy, the environment and food for the nation, and discredit the raft of misinformation dished up by self-appointed environmental experts who would rather not let the facts get in the way of a good story.

On a positive note, this issue of New Zealand Aquaculture features the latest developments from the aquaculture scientific world. Our man across the ditch, John Mosig, shares his interesting views from Australia.

And we introduce another new member of our team, Dorothy-Jean McCoubrey, a former regional shellfish specialist. She will provide advice on shellfish market development and standards.

As the last word, remember, we vote our politicians in to work for us. Let's make them accountable.



CAWTHRON APPOINTS SUSTAINABILITY EXPERT

The Cawthron Institute has appointed an experienced resource economist, Jim Sinner, as sustainable business group manager.



Jim Sinner was previously a senior fellow for the Ecologic Foundation, where he ran a Foundation for Research, Science and Technology (FRST) project on institutions for sustainable development. He has also

worked as a senior policy analyst and an independent consultant on significant projects, including climate change (competitiveness issues; emissions trading), biosecurity, water management, fisheries, trade policy and other sustainability and resource management issues.

Cawthron's chief executive, Gillian Wratt, says Jim's skills will further strengthen Cawthron's sustainable business group.

"Jim's resource economics and policy knowledge is a valuable asset that will complement Cawthron's existing economics, environmental research and modelling capabilities.

"His specialist expertise adds extra depth, and enhances our ability to provide integrated business development advice that helps client businesses operate efficiently, profitably and sustainably."

Gillian Wratt says that Jim's recent research on Institutions for Sustainable Development will also be useful to clients. The FRST project looked at integrating the true cost of natural resources into the market economy, and resolving tensions between democracy and sustainability.

This new research would help businesses understand the true nature of sustainability,

she said. "Having someone who has been leading that research as part of the Cawthron sustainability team is very exciting."

Jim Sinner has also worked closely with central and local governments, advising on policy options to encourage and reward sustainable business practice in fisheries, greenhouse gas emissions, water and air pollution, and water use.

Cawthron says it has been growing the group over the past few years, and the appointment expands the team to seven. They cover a wide range of areas, including sustainability strategies to escape the compliance cycle, optimal and equitable resource allocation, green products, sustainable technology, sustainable primary industries, sustainable and organic food production, eco-tourism and water conservation.

Jim Sinner says he's excited about the challenges of his new role.

"I'm looking forward to adding my policy and economics skills to Cawthron's great science capability, to work more closely with businesses and government agencies to address the challenges surrounding sustainability.

"I've worked in partnership with Cawthron in the past and have the highest respect for both their professional and personal manner, so it's great to be joining the team."

MODIFIED FISH GIVE OFFICIALS THE SLIP

The Ministry of Agriculture and Forestry is trying to trace a number of genetically modified aquarium fish that were mistakenly imported and sold in pet shops throughout the country.

Initially 210 of the modified zebra danios were brought into the country. They have since bred, and as at September 25 MAF said it had found 333 of the fish. They had been genetically modified with a red fluorescent

protein, giving them an unusually bright redpink appearance.

MAF's incursion manager, David Yard, says the GM fish pose an extremely low biosecurity risk, as they are unlikely to enter the food chain or have any environmental impact. He says they are tropical and are unlikely to survive outside a temperature-controlled tank.

HARBOUR TO BE HOME TO OYSTER FARM

The largest harbour in the southern hemisphere is soon to be the home of the largest oyster farm in New Zealand. Approval has been granted to Biomarine Ltd of Snells Beach, allowing them to begin work on a project that promises to provide around 100 jobs to the local Kaipara Harbour community.

The farm will be protected from open sea swells by sandbanks opposite the entrance, and will be 4km from the nearest landfall. A shore base is being set up at the mouth of the Hoteo River, and ultimately a new processing plant will be built near Warkworth.

It is expected that about 7000 baskets will be put in on 6000m of lines this summer, with a similar amount to be built next year.

A new 13m barge to service the farm was launched with a Maori dawn blessing and welcome.

It is expected that this barge will be adequate for the first three years development, by which time another barge will be required. When fully developed, at least four barges will be in operation seven days each week.

With huge inflows and outflows of seawater each tide, and with no sources of runoff or human pollution from houses or boats anywhere nearby, the water quality is extremely high, says Biomarine's director, Jim Dollimore. He says the Cawthron Institute had developed a rigid bio-security plan designed to prevent the transport of pests between harbours.

AUSTRALIAN CHILDREN NEED MORE OMEGA-3

Australian children should increase their intake of omega-3 by as much as five times their current level

The report by the Omega-3 Centre said the low intake of foods rich in long-chain omega-3s, called EPA and DHA, was contributing to a range of health problems prevalent in Australian children.

It recommend that children aged 14 years and over consume at least 500mg of omega-3 DHA and EPA per day. The average child surveyed consumed between 34 and 118mg per day.

"Most children these days often just don't like fish," said Andrew Sinclair, a Professor of Human Nutrition at Deakin University and an international omega-3 expert.

See www.omega-3centre.com

BANK SUPPORTS AQUACULTURE NEW ZEALAND

A significant lender to the aquaculture industry says Aquaculture New Zealand, a single unified organisation for the industry, was a significant step forward, said Rabobank's general manager for rural New Zealand, Ben Russell.

Its formation comes at an important time for the industry. Aquaculture was the world's fastest growing animal protein sector, and production was expanding rapidly, particularly in developing countries. Consumer demands were also changing rapidly,

Russell said opportunities far outweighed any threats. "Consumers' requirements for products that can demonstrate the key elements of corporate social responsibility, and associated supply chain integrity, play well to the competitive advantages of New Zealand aquaculture.

"The New Zealand industry had to continue to differentiate itself on the basis of quality, sustainability and product integrity from the likes of China, Thailand and Vietnam on a lowest cost of production playing field is a contest we are likely to lose."

Russell said the New Zealand industry had already undergone significant changes in the business environment, citing the law reforms of 2004 and the Aquaculture Strategy. Aquaculture New Zealand was another critical step in aiding investment in the industry.

Russell said good information on industry outlook, production, markets and risks would increase confidence and speed investment.

AQUACULTURE MEANS A+ FOOD

BY DOROTHY-JEAN MCCOUBREY

o often today we hear in the news that we should be suspicious of our food supply. We are constantly bombarded with messages that we will be poisoned. Remember "Corngate", Sue Kedgley's concerns about imported foods, pesticide residues, and campylobacter in chicken, to name a few examples. Such concerns mean many consumers now want natural food and to know the origin of products.

So how does seafood stack up? Does aquaculture mean that we have products full of artificial residues? A review of the health literature guickly shows that seafood provides a range of health benefits. It is high in protein and low in fat. Scientific studies have shown that Omega-3 fatty acids help maintain cardiovascular health, are important for pre and post-natal neurological development, and many prevent depression and alleviate the symptoms of rheumatoid arthritis.

If the world is to enjoy the health benefits along with the gastronomic delights of seafood, aquaculture is the only longterm sustainable way of doing so. Although aquaculture has been practised in many countries for centuries, its expansion and intensification is a modern phenomenon.

It is expected to grow in response to diminishing worldwide seafood resources. Many countries have already depleted their wild fish resources, and although New Zealand constantly makes hard quota decisions to ensure sustainable wild fisheries, we will need to rely more on aquaculture in the future.

The Food and Agricultural Organisation noted that in 1980 just nine percent of the world's seafood came from aquaculture, but by 2006 this had risen to 43 percent. The FAO believes that an additional 40 million tonnes of aquatic food will be required by 2030 just to maintain current levels of consumption. Aquaculture is going to be crucial in providing the world with a nutritious food source.

The aquaculture industry not only provides sustainable seafood supplies. As with any type of farming, the aquaculturalist has so much more control over the quality compared with gathering from the wild. Products can be grown in controlled conditions, where food safety and quality can be monitored and the seafood harvested when it is in peak condition. Processing companies can then be ready for these harvests, with the latest food technology to quickly transfer fresh seafood into quality

New Zealand is blessed with a great environment for aquaculture - plenty of coastline with none of the chronic pollution levels experienced by fish and shellfish farmers overseas. During the 1970s, when many of the current shellfish leases were issued, care was taken to place them in areas remote from human habitation. Today we still do not need to use any artificial foods, aquaculture drugs or pesticides on the crops. However, New Zealand's seafood industry has always been interested in food safety, and knew that international trade would be boosted if there was a guarantee of safe seafood.

In the 1970s the marine farming industry asked the government to help them establish an internationally recognised food safety programme. So industry and regulatory agencies jointly worked with the United States Food and Drug Agency's public health officials to introduce the shellfish quality assurance programme. As a result of this successful collaboration we were able to freely export to the United States, and this opened up



Dorothy-Jean McCoubrey is a former regional shellfish specialist. The position had a wide range of responsibilities (education, dealing with the science providers, overseas regulatory agencies, auditing, compliance and general public health around the shellfish industry).

Her position was disestablished so she formed her own company to continue providing her skills to the seafood industry.

"Companies need to access markets and provide confidence to these markets. They need to ensure that their seafood is safe to eat and understand what their market requires."

Dorothy-Jean says she was heavily involved in the hard decisions around Waikare Inlet, an oyster area which was impacted by pollution caused by others, and where the oyster farmers suffered the consequences.

Her goal is to work with scientific and regulatory agencies to ensure that New Zealand introduces national environmental indicators and controls that must be used where shellfish is harvested.

our world export opportunities.

Since then, our export markets have grown until we now send products to more than 60 countries each year. Our food safety programmes have also expanded to include features required by the European Union. Today New Zealand's aquaculture food safety programmes are recognised as being the most rigorous in the world, providing international consumer confidence.

All New Zealand's commercial seafood farms have some form of monitoring. This means that farmers can quickly adapt harvesting practices to only gather quality products. Regular audits by international public health agencies show that consumers can safely enjoy our products.

The industry should remember that aquaculture provides a marketing edge. New Zealand has the unique combination of clean water and food safety monitoring programmes that enable farmers to control the quality of the harvested product.

The industry is in a great position to provide consumers with confident messages about the origin of product, how it has been monitored right until it is packaged, and the health benefits of purchasing New Zealand's aquaculture seafood.





ENVIRONMENTAL PUBLIC HEALTH SPECIALISTS

- Flexible and can adapt to your needs for Project Management, Problem Solving, Positive Outcomes
- Advice, Harvest area problems, Market access, Training, Interpreting regulations & science

5 Lemonwood Place, Manurewa, Auckland tel: 09 2664680 mbl: 027 206 0596 email: dorothyjean@xtra.co.nz

BLUE COD SUSTAINABILITY, enhancement and aquaculture





ABOVE LEFT: Blue cod are carefully measured using gloves to minimise handling

ABOVE RIGHT: A large specimen from the site inside the reserve

RIGHT: Blue cod kept in a bin slung overboard until released together

BELOW: The Department of Conservation vessel used to conduct the





n annual blue cod survey was conducted in the Marlborough Sounds during the April school holidays. The survey assessed stock levels in the sounds and inside Long Island Marine Reserve. Volunteer participants included students and staff from Marlborough Boys High, Queen Charlotte College and Seahorse World, together with Department of Conservation staff.

Using fishing rods and barbless hooks, several people fished until 80 cod were caught, or two hours of fishing was completed. All species caught were recorded and placed in a holding bin full of flowing seawater on the stern of the fishing survey vessel. Once fishing was completed, the length of all fish were recorded.

The fish were placed in a submerged tank overboard and released together once measuring was completed. This minimised the chance of barracouta preying on stock returned to the sea at the end of the survey.

It was great to see young people volunteering for a day out helping with the survey. The enthusiasm of the students when they hooked up and reeled in cod after cod was heartening. All the participants eagerly looked forward to surveying the reserve site. Whereas it took about an hour or more to survey

the control sites and catch 80 cod, when the reserve sites were fished the same number of cod was pulled up in 10 to 20 minutes, and a number were well over the legal limit of 300mm. With sore wrists, arms and THE BLUE COD shoulders from hauling in cod, students eagerly set

STUDENTS WERE SHOWN HOW PROCEDURES HAVE BEEN ADOPTED TO HELP CONSERVE **FISHERY**

about weighing the catch before returning them to the sea.

Students were shown how procedures have been adopted to assess and help conserve the blue cod fishery for future generations. The success of this reflects the sustainable development and multiple-use approach the Marlborough District Council has adopted towards utilising this wonderful resource

Integrating resource utilisation is perhaps the key to future sustainable development. The integration of conservation, fisheries and aquaculture may be the key to a sustainable future as demand for seafood continues to increase worldwide.

For blue cod, as with other fish species, stock enhancement and/or cage culture could exist together with marine reserves, and the combination may ensure the long-term viability and sustainability of fish stocks. Further, some fish species are easier to breed than others.

In some circumstances, depending on the business case, it may be more economically viable to enhance wild stocks rather than rear individuals to a harvestable size in captivity.

Fisheries enhancement through aquaculture could be further investigated as a useful conservation tool in combination with marine reserves to relieve long-term fishing pressure on our stocks.



Hawkesbury farmers REFUSED TO BE BROKEN

BY REG BREAKWELL

yster farmers have been part of the community around the Hawkesbury River in New South Wales since the industry began in the state more than 130 years ago.

The farms are renowned for their native, sweet-tasting Sydney rock oysters, Saccostrea glomerate, which shellfish lovers devour and restaurants feature prominently in their menus.

An outbreak of QX disease in 2004 wiped out the incomes of about half the farmers, but those who remained are re-establishing the estuary as a leading producer of a new strain of QX-resistant Sydney rock oysters, as well as triploid, or sterile, Pacific oysters.

The Sydney rock oysters in the river, about 100km north of Sydney, were caught almost entirely by using the traditional stick and tray method, using tarred hardwood sticks placed annually on inter-tidal post-and-rail racks towards the mouth of the estuary. The sticks were then moved upstream, and the oysters knocked off into Tooltech Standard and XL6 Aquatrays for fattening for three to four years until they reached the marketable size of around 60g.

In 2004, tests confirmed the presence of the protozoan oyster parasite Marteilia sydneyi, the causative organism for the highly virulent QX disease that affects only the Sydney rock oyster.

The New South Wales' Department of Primary Industries quarantined the river, but within a year the disease had spread throughout the estuary, wiping out many farm incomes.

The NSW government, in particular the state's Minister of DPI, Ian MacDonald, set up an A\$3 million assistance package. Farmers used most of it to dispose of dead and dying oyster stock, unserviceable growing sticks and other material. This gave the farmers a cashflow lifeline while they attempted to rescue their industry.

The rescue measures included approval from the NSW government to cultivate hatchery-produced triploid Pacific oysters, which are not affected by QX disease. The approval was required because NSW has classified Pacific oysters as pests, and was only granted after extensive environmental impact assessments.

Pacific oysters were inadvertently introduced in the 1950s and have overtaken some inter-tidal foreshores and smothered Sydney rock oyster crops.

Meanwhile, researchers at the DPI research station at Port Stephens, just north of the Hawkesbury, were preparing to commercialise a strain of QX-resistant, fast-growing Sydney rock oysters bred from parent stocks selected over several years from survivors of QX outbreaks in the Georges River, south of Sydney.

The Hawkesbury farmers were quickly allocated a trial shipment of 200,000 of these spat, and placed them on the heavily infected upstream fattening leases alongside control wild-caught oysters sourced from other QX-free estuaries.

The farmers then banded together under the leadership of Robbie Moxham, to form a cooperative, Broken Bay Oysters, to plan for the future and assist individual farmers.

The cooperative faced two significant problems. The first was acquiring a reliable supply of triploid Pacific spat. After a few initial setbacks, the Tasmanian company, Shellfish Culture, the only Australian company licensed to use patented male tetraploid triploid technology, ensured that the spat was readily available.

The NSW government again helped the farmers by allocating \$200,000 so they could buy the spat.

The second problem was that NSW biosecurity regulations stated that the Pacific spat had to be around 3mm in size. As traditional stick farmers, the cooperative had little or no experience of handling single-seed oysters or commercial quantities of tiny hatchery spat.

A group of farmers overcame the problem by growing the small spat to a size where they could be ongrown on the existing fattening trays and lease infrastructure. The spat were enclosed inside zippered 600 and 1000 micron mesh bags placed within floating, sealed baskets in the oyster leases to take advantage of the abundant natural plankton.

The farmers soon discovered that the oysters grew rapidly and with very little mortality. Not only that, the rolling action of the basket in the waves also provided early shape to the young Pacific oysters. The first batch reached market size in 12 months, and won a silver medal at the Royal Agricultural Society's Fine Food Awards, then first place at an NSW oyster industry field day in 2006.

The QX-resistant Sydney rock oysters are also showing promise. Only 18 percent of the resistant strain had succumbed to QX by harvest time, as against 10 percent for the normal mortality rate, and they reached marketable size within two years.

By comparison, more than 90 percent of the control oysters succumbed to QX, and the survivors took at least a year longer to reach marketable size. Now other farmers throughout NSW are said to be taking up the resistant strain.

The farmers with the Broken Bay cooperative are still playing financial "catch-up", but they are now re-establishing the estuary as a leading oyster producer. They are adopting the latest technology and working cooperatively on marketing. And with the aid of the DPI they have introduced safe work practices that should also be profitable.

Their experience will also serve as a model for other farmers who may have to deal with QX outbreaks.

Now both oyster species are being successfully farmed in the Hawkesbury River, thanks to a small group of "neversay-die" farmers.





Coastal occupation charges and rating of marine farms: OFF THE AGENDA, FOR NOW...

JUSTINE INNS

ecent developments suggest that marine farmers have escaped the imposition of additional local government charges for the time being, but that the reprieve might not last for long.

In July, the Auckland Regional Council notified a proposed change to its regional coastal plan to the effect that it has resolved not to introduce a coastal occupation charging regime "at this time".

The rationale for the changes is that "a sustainable coastal occupation charging regime cannot be developed at this time, due to legal and policy uncertainties relating to section 64A [of the Resource Management Act 1991].

"These include a lack of clarity about what are coastal occupation charges, that there is no presumption to charge, the lack of an agreed nationally consistent charging methodology and other equity issues."

The proposal is still subject to public consultation, but seems to have been generally supported by submitters to date.

Efforts by the marine farming industry, in particular, seem to have helped convince the ARC that coastal occupation charges should be consigned to the "too hard" basket until the government has provided more guidance on s.64A of the RMA. The Auckland move is significant in that the ARC was regarded as having made the most progress towards establishing a coastal occupation charging regime, and a number of other councils had adopted a "wait and see" approach to its initiative.

Coming from a different angle, the Marlborough District Council has for some time asserted that marine farms are (or should be) rateable under the Local Government (Rating) Act 2002 on the same basis as land. This issue was argued between the council, on the one hand, and the Valuer-General, the Minister of Conservation and marine farming interest on the other in the High Court earlier this year.

Justice Young handed down his judgment on the issue on September 3 (Marlborough District Council v Valuer General and Others, CIV-2006-485-933).

The council proposed a number of different bases on which marine farms should be considered rateable, but the court rejected all of them, ruling that:

• the mussel farms are not an "interest in land", owned by the farmer, because s.122(1) of the RMA prevents either the coastal permit, or the mussel farm componentry installed on the site, being considered real or personal property.

- the Foreshore and Seabed Act 2004 prohibits the Crown from granting any interest in the land of the seabed arising from a coastal permit for a mussel farm
- neither a coastal permit nor its operation gives a mussel farmer exclusive occupation rights in the area in question (unless the permit expressly provides that that is the case).
- mussel farm components are not "part and parcel" of the Crown's seabed land, and parliament could not have intended that the Crown would become a ratepayer of seabed land, due to the fact that the council had granted a mussel farm permit under the RMA to a private individual,
- coastal permits authorising the operation of mussel farms are not "a lease or licence or other agreement" allowing commercial use of Crown land, as the relevant provision clearly relates to formal legal agreements and did not apply in the present case.

However, as noted above, marine farmers might be well advised to keep their celebrations over these two victories brief, because other clouds are gathering on the horizon.

The report of the Local Government Rates Inquiry, entitled Funding Local Government (released August 2007) touched on the subject, in its examination of additional - unfunded - responsibilities placed on local government, and noted that the 2004 aquaculture reforms significantly increased councils' responsibilities in respect of planning for aquaculture management areas.

The second recommendation contained in the report is therefore "that the relevant provisions of the Resource Management Act 1991 be reviewed to streamline the power to charge a resource rental for occupation of coastal space."

It can, fairly, be argued that the distinct lack of interest most regional councils have, to date, shown in proactively planning for aquaculture development under the new regime can at least partly be blamed on a lack of funding.

There are real questions, however, about the equity of levying existing marine farmers for the cost of opening up new AMAs. Moreover, ongoing difficulties with the legislation suggest that money alone will not be enough to get the system working.

> Justine Inns is a senior associate with Oceanlaw. She previously spent more than a decade as an advisor to various iwi (tribes), including several years with Ngai Tahu.

OCEANLAW NEW ZEALAND

The only law firm in the South Pacific dedicated to the sea

email martylo@oceanlaw.co.nz www.oceanlaw.co.nz

14 New Street, PO Box 921 Nelson. Phone 64 3 548 4136, Fax 64 3 548 4195, 0800 OCEANLAW



Health-related trade barriers little risk FOR EELS FARMED IN NZ

BY STEVE WEBB AND HENRY KASPAR, CAWTHRON INSTITUTE

he global New Zealand \$3 billion per year eel industry still depends on harvesting wild glass eels for on-growing. Glass eel harvests everywhere are in decline, and ongoing environmental degradation means that this trend is unlikely to reverse. Worldwide, research and development on hatchery production of glass eels is intensifying, and the Mahurangi Technical Institute is a serious player in this endeavour.

Once the supply of glass eels from hatcheries is secured, eel farming can become a significant and sustainable New Zealand export industry. Since trade barriers based on fish and human health criteria could become commercial obstacles to eel exports, we have reviewed the pathology of eels to answer the question: do New Zealand eels harbour diseases that could prevent their export into the important eel-consuming economies?

No, they don't. Not because New Zealand eels have no pathogens, but because most of their pathogens are also found overseas, and others are of less significant threat. A bonus is that some disease agents of major concern overseas have not been found in New Zealand eels. Besides answering the question above, the review gauged hazards faced by New Zealand eel aquaculture, and also quantified pathogen species reported in New Zealand and overseas eels.

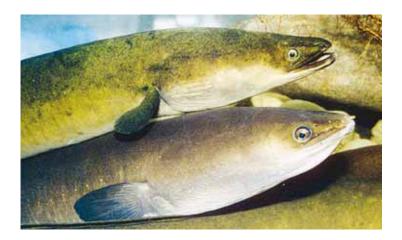
New Zealand has a reported 61 eel pathogen species. Other countries such as Japan (32), Denmark (26), Australia (22), Taiwan (14) and China (six) report fewer. These numbers might have more to do with the degree of local interest than with how many pathogens there actually are.

A different impression is given if a comparison is made between the eel species and their pathogen loads. Here, the European eel leads with 131 pathogen species, followed by the American eel (117), the short-finned New Zealand eel (54), the long-finned New Zealand eel (53), and finally, the Japanese (Asiatic) eel, with 50. While these numbers may sound alarming, it doesn't mean that eels are prone to disease and are therefore difficult to farm - all livestock animals face multiple disease risks. The threat posed by each pathogen must be assessed in terms of its potential impact on humans, eels, and other fish.

Our study revealed that human health risks posed by New Zealand eel pathogens never exceed, and are usually lower, than those elsewhere. For instance, New Zealand eels have three reported species of anisakid roundworms, but these are also reported overseas. The roundworms found in New Zealand eels are of slight significance, since other anisakids, absent from New Zealand eels, constitute the bulk of human infections overseas.

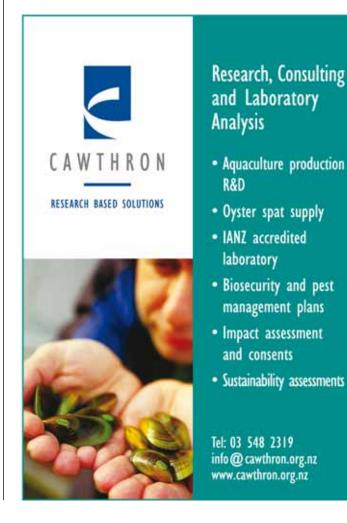
Other human pathogens absent from New Zealand eels include the giant fish tapeworm, a protozoan infective to immuno-compromised patients, and a bacterium related to cholera. This bacterium also inflicts commercial losses on brackish-water eel culture in Europe.

Although eels and other fish in New Zealand do harbour eel-killing diseases such as infectious pancreatic necrosis, enteric redmouth disease, whirling disease and white spot disease, these



are also widespread overseas, and there are methods for their control or elimination by good husbandry and appropriate treatment.

For a copy of Cawthron Report 1248 on the parasites and diseases of eels, email lynne.huddleston@cawthron.org.New Zealand





ACROSS THE DITCH: Consumers want convenience

BY JOHN MOSIG

iday Kiwi. Over on this side of the Tasman we're finding that some species of finfish are farming better than others. Are you finding that too?

In the early days we grew anything we could get our hands on, thinking that variety would give us a greater entrée to the markets. Because whenever we went to have a look at what the punters were buying at the fishmonger, we were confronted with an array of fish and seafood that seemed positively exotic.

It is only recently that we have come to realise that this "run of catch" was just a matter of what was available, and in its turn, what was convenient for the opportunity harvesters of the oceans to haul in, a catch-what-catch-can marketing approach.

We also had a range of indigenous species to exploit. While the Murray Darling Basin didn't offer a huge range, anglers highly prized what it did offer:

As for export, if we had it in surplus, or could achieve a higher price for a particular line overseas, we'd sell offshore. Take my home state of Victoria, for instance. In 2005/06 the wild fishery was worth A\$76 million, of which \$64 million was made up of abalone (paua) and rock lobster (crayfish). Take out those export-driven prices and markets and that leaves \$12 million. The local aquaculture industry was worth \$21.6 million, and of that, \$5.6 million came from abalone.

With the culture fishery making up half the seafood consumed, that line-up on the ice trays of your favourite seafood outlet is changing, and will continue to change, as farmed products come to dominate the global seafood commodity market.

As the seat of the pants pioneers give way to serious investors, the development of aquaculture here in Oz is being driven, in most cases, by a planned market entry. Hand-in-hand with that goes production costs that allow market entry at a viable figure.

Of the two dozen finfish species listed in the 2004/05 national production data, only eight generated seven-figure returns, and only southern bluefin tuna (\$139 million), Atlantic salmon (\$112 million) and barramundi (\$24 million) topped \$20 million. And the SBT sector is purely a feedlot operation geared to the lucrative Japanese market.

The market pyramid starts off with the white tablecloth restaurant and catering trade at the pointy end. I think we've all been to those places where the waiter floats a napkin as big as a double bed sheet down over your lap and the main, three scallops and a snow pea, arrives on a plate the size of a tractor hub cap. It's a pricey market, but not a big one.

The big market is for Friday night fish and chips, the fisherman's basket at the pub. In Oz, that comes in thawed for our convenience, not a little of it from your side of the Tasman. The middle range market is the fresh fish market. That's where the food-conscious, and let's be open here, the better-endowed consumer, is spending their food dollars. The home-cooked meal consumers and the elbows on the table restaurants are where Australian growers are targeting their production.

For the discerning consumer, the issue is not so much price as value. Salmon, or more correctly, the illegal possession of,

earned many of our ancestors a free ticket to the Wide Brown Land. Now we can buy it for around the same price as a piece of steak. That's value.

A gilled and gutted rainbow trout sells for less than the same weight of lamb. Yet some species are still out of reach of the mainstream consumer. Our iconic Murray cod, for instance, a fish that grows to 100kg, is an example of a species that just hasn't caught on as a farming species, because the cost of production has left it out of reach of the mainstream markets.

Of all the terrestrial species we have domesticated over the millennia, how many are we still farming? After poultry, cattle, sheep and pigs, there's not all that many. Why? Because they were the ones we could farm profitably, for all sorts of reasons, convenience among them. How soon will farmed fish follow the same pattern? It's happening elsewhere and we can see it happening here.

The production figures for 2004/05 show that Atlantic salmon were worth \$112 million, while Chinook salmon made up \$27,000. Rainbow trout were worth \$16 million, while brown trout production totalled \$530,000.

Brown trout and Chinook salmon will have their following, yours truly among them. However, the harsh market reality is that it is more profitable for the growers to produce them, and because of this farmer-driven volume, it is more profitable for the marketeers to throw their weight behind them.

The species that is taking off here is barramundi (Lates calcarifer), both here and overseas. It has all the attributes of a farming species. It is fecund: 100,000 eggs per kilo of bodyweight. Broodstock can be conditioned to breed year-round. This in itself is a precursor for a super fish. Genetic improvements can be gained far more easily and specific pathogen-free fry can be produced. It grows fast, its dietary requirements are established, and of course it has market acceptance.

But more than that, it can be grown economically to a size from which it can be processed. The discerning consumer also wants convenience. Raised in the Disneyfied world of Bambi and Flipper, they are no longer prepared to look a fish in the eye and peel the flesh off the frame. They want protein that doesn't look like a fellow creature. And they certainly don't want to be bothered about bones. It's also easy to cook a salmon or a barramundi steak. So the mainstream fish of the future may be limited to just a few species. As aquaculturists, we have to pick which species they are going to be.

There are no second prizes here. Not too many people reading this column would have heard of a wire recorder? But there were as many around in the early days as tape recorders. And Beta video cassettes? Apart from those buried in the junk in the bungalow, where would you find one today? Okay, so digital technology has overridden both, but you get the point.

And that might just be the point. How can we be sure that today's super fish might turn out to be tomorrow's fertiliser? We can't, but we wouldn't bother getting out of bed if we took that view, eh?

Contact John Mosig on mosig@netspace.net.au

PERCH EGGS SENT TO IRELAND (or was that coals to Newcastle?)

BY DAVID COOPER

he Mahurangi Technical Institute in Warkworth sent off the first shipment of live eggs of the freshwater fish species redfin perch (Perca fluviatilis) to a fish hatchery in Ireland on September 7.

The five boxes in the shipment contained approximately one million eggs, and was followed one week later by another of the same size.

The event was covered by a film crew from TV I News, who also filmed a perchcooking demonstration at The Veranda, a local restaurant in Warkworth. Incidentally, it is the only restaurant in New Zealand to have perch on the menu.

Like most "firsts", certainly the ones that occur at the institute, this seemingly simple operation was the result of several months of hard work and preparation, and a considerable amount of paperwork to ensure legal compliance.

An export certificate had to be developed by the Biosecurity arm of the Ministry of Agriculture and Forestry to comply with the complex and demanding European Union import requirements, and it has to be said that this department really pulled out the stops and delivered the goods under considerable pressure. Agriquality New Zealand also had to audit the institute's aquaculture facility to ensure that it complied with EU standards.

Perch have been held and bred in recirculating aquaculture systems at the MTI for a number of years, always with the belief that they had potential as an aquaculture species in New Zealand. The request for cooperation from PDS Irish Waters Perch Ltd. in County Cavan, Ireland, simply reinforced this belief and drove the perch research up the priority list.

Perch farming in Europe is developing into a significant industry, and the hatchery in Ireland is a major supplier of grow-on stock, Switzerland is one of the major users of redfin perch and imports around 4000 tonnes of fillets annually.

One of the factors limiting the growth of the industry is the ability to provide sufficient fingerlings to farms, and the fact that redfin perch are seasonal spawners limits hatchling

production. Enter good old New Zealand with seasons exactly opposite to those in

The motivation here is that if Ireland can successfully import "out of season" eggs from New Zealand, they can in theory double their

production. By a great stroke of luck, New Zealand is also free of the major diseases that cause problems to European fish farmers.

Redfin perch were introduced into New Zealand in the 1860s, and are now widespread throughout the country. In some areas they are regarded as a "sport fish", but they are also gazetted as an aquaculture species and can legally be farmed. They have a firm, white flesh and taste somewhat similar to gurnard.

Redfin perch will tolerate relatively low oxygen levels and relatively poor water quality compared with many other species of fish, which means that they can be stocked at quite high densities and are therefore an appropriate species for production in recirculating aquaculture systems. This form of perch production lends itself to small and mediumscale operations such as is practiced in many countries with a range of species.

"It is our belief that perch farming, especially by small to medium-sized operators on small blocks and in backyards, has great

potential in New Zealand," says the director of the MTI, Paul Decker.

"And with the expertise we have developed and our contacts in the European industry, the MTI is uniquely placed to be a provider of fingerlings and consultancy services to enable this industry to develop.

"The development of perch farming in New Zealand will surely help to foster the wider exploitation of the hitherto unrealised potential for freshwater aquaculture in New Zealand, and even pave the way for the development of other freshwater species that are already here, such as trout," Decker said.

Perch farming of course also fits perfectly with the government's aims of encouraging the aquaculture industry to develop new species that are already in New Zealand, which of course circumvents the biosecurity issue surrounding the importing of new species.





PUKEKOHE TIMBER PACKAGING LTD

FOR ALL YOUR Marine Grade Timber Requirements

lan Glasgow 0274 997 263 Amanda Verheyen 0276 355 582



Ensuring market access FOR SEAFOOD PRODUCTS

BY DANETTE OLSEN, CAWTHRON INSTITUTE

he Foundation for Research, Science and Technology (FRST) is to invest \$10.9 million in seafood safety research over the next six years by a consortium of research providers led by the Cawthron Institute.

The end result of the research programme is to allow our \$1.3 billion seafood export industry to identify and manage micro-organism risks to seafood.

The research team involves New Zealand's leading seafood safety researchers from Cawthron, AgResearch, ESR and Crop & Food.

Guaranteeing that New Zealand shellfish are safe to eat has been an industry focus for many years. This new seafood safety research programme builds on a solid base of research conducted by Cawthron through a previous FRST-funded contract that made major changes across biotoxin detection, identification processes and risk assessment.

These advancements have not only saved the industry time, money and stress, but are also helping to convince international regulators to review their list of biotoxins and thereby free up access to overseas markets for our shellfish.

The new programme has a big remit: to understand the risks from a wide range of micro-organisms (microalgae biotoxins, viruses and bacteria), and confer benefits to New Zealand through technologies for industry and regulators that safeguard and promote the quality and safe food reputation of our unique seafood products.

A senior scientist at Cawthron, Dr Lesley Rhodes, who will head the programme, says much of the research will be world-leading. "We've designed the research to create cost-effective tools to enable the industry to forecast and rapidly respond to micro-organism threats.

"But the key to their success is that the tools are based on solid science. Our aim is to have all our methods validated and internationally accredited."

The research will address four key areas of concern in seafood safety:

- Micro-algae toxins. The micro-algae toxin research will look at the effects of algal toxins on seafood and then on human health, and examine safety factors to ensure protection of all seafood consumers.
- Contaminants. Contaminant research will involve providing the seafood industry with on-site monitors, evaluating new, harmful micro-organisms, and developing ways to mitigate the
- Viruses. Viral contamination from raw sewage discharges is a growing problem. This research will develop a fast and cheap test for viruses, help breed viral contamination-resistant strains of shellfish, and investigate ways to clean shellfish after harvesting.
- Bacteria. Bacteria research will include finding fast methods to detect bacteria in seafood premises, evaluating particular bacteria for health risks and developing appropriate control

Cawthron's chief executive officer, Gillian Wratt, says the research is vital to protect New Zealand's safe food image, premium quality status and international market access.

"We are pleased to be able to make such a significant contribution to the industry. The research will give seafood producers and exporters much-needed assessment and control tools to help eliminate micro-organism threats to seafood. This is about providing practical, research-based solutions that will help boost our export industry."

The researchers will continue to assist European Union regulators in setting appropriate regulatory levels for biotoxins in seafood. A New Zealand industry advisory group will closely monitor the programme, and will meet regularly to consider the results and directions of the research.



Cawthron

Veronica

Beuzenberg and Tim Nalder work

with large cultures

of toxic algae. The breathing masks

are because some

toxic aerosols



INNOVATIVE PROGRAMME at college aquaculture academy

BY DR ANDREW MORGAN







he future of aquaculture in New Zealand rests in the hands of our young people. At Queen Charlotte College, Dr John Whitehead is spearheading the way with an innovative programme of studies in aquaculture as part of the school curriculum.

Queen Charlotte College provides a fine example of integration in training and education in the maritime sector, and creating awareness in our young people of how aquaculture fits into the bigger picture for New Zealand.

The college's Aquaculture Academy offers courses in aquaculture at years 11, 12 and 13. If students follow the courses, they can sit the National Certificate in Aquaculture (at level two and three). The courses include industry visits, fieldwork and training in diving, boat handling and first aid.

In year 11 the course focuses on the Greenshell mussel industry and includes the day skipper and PADI open-water diver's course. In year 12, students can attain the level 2 National Certificate in Seafood with Aquaculture. Students may enter at this level without completing the year 11 courses. The year 12 courses offer a broader understanding of New Zealand aquaculture, with a focus on environmental awareness and sustainability.

In year 13, the students carry out meaningful research related to the aquaculture industry. Those who have passed all the assessments from years 11 and 12 achieve the level three National Certificate in Seafood with Aquaculture.

Those who attain the PADI open water dive certificate can extend this to advanced diver certification if they pass a medical. Additionally, students may sit the VHF radio operator's certificate organised by the Coastguard.

Queen Charlotte College has its own water space at Shakespeare Bay and operates its own mussel barge for research. Further, the establishment of a recirculating water system on the college grounds, courtesy of New Zealand King Salmon, will enable students to work collaboratively with the industry and scientists from other institutes. The college also has strong links with the Cawthron Institute and is supported by the New Zealand Marine Farming Association.

Although students may not go straight into careers in the aquaculture industry, the courses create an awareness of the significant contribution aquaculture makes to New Zealand's primary production and the diversity of jobs available.

As the industry moves forward more jobs will become available. They can include driving vessels and mussel barges, harvesting, processing, research, enhancement and value adding, teaching, diving, construction, engineering and resource management.

Queen Charlotte College is also moving further into training and education in land-based aquaculture facilities. Aquaculture is about getting stuck into tanks and plumbing, and working with animals and water. The fundamentals of applied science give these students a great head start in their careers.









1. The golden olden days. A much younger Ray Mephan catches his first cod along with the passion that is aquaculture

2. Ray Mephan with the marker commemorating his contribution to the industry and the

region

3. Cod fingerlings ready to be restocked

A PIONEER OF MURRAY COD

BY JOHN MOSIG

he word pioneer is bandied about a bit, but in Ray Mephan's case it is used in the fullest sense. Ray was breeding Murray cod (Maccullochella peelii peelii) in the mid-1970s before all but a few of us knew that aquaculture was spelt without a k.

But it was more than just the technology that he developed that has earned him the respect of his peers. The upper McIntyre, depleted of cod when he started his breeding programme, is now, due to Ray Mephan's re-stocking efforts, one of the premier cod fishing grounds in Australia.

His passion for and understanding of the symbol of the Murray Darling Basin has seen the big fish re-established in the upper tributaries of the Darling. Any angler posing with his 40kg trophy cod should be saying a silent prayer of gratitude to the Mephan family for their nearly four decades of dedication to aquaculture and angling.

Situated 750m up in the New England ranges in the Elsmore district of northeastern New South Wales, the hatchery is well-watered from natural run-off. Over the years Ray and his son, Kevin, have established a reputation as suppliers of quality fingerlings.

They do yellowbelly (Macquaria ambigua) as well as cod, and Ray estimates he would have reared a million cod for restocking in private dams and public waterways since 1970, and as many yellowbelly since they started breeding them in 1990. They also do eel tail catfish (Tandanus tandanus) to order:

The operation is low-key. The hatchery is a flow-through system. Water is gravity-fed from the 40,000 litre storage reservoir through a black plastic pipe laid across the ground to warm the water. At night the water is turned off to prevent the reverse effect. Air stones are used to maintain oxygen levels overnight.

There are five broodstock ponds and 20 larval ponds on the farm. Water is either used on the farm or held in a settlement pond. The smaller pond sizes enables them to drop a pond and harvest fingerlings for a particular order.

"Farming fish comes down to the astuteness of the managers, observation and experience, but above all, water quality," Ray said.

The nesting boxes usually have eggs in them by late September, and the staff keeps checking the boxes until late October. They can get up to three spawnings per box in this time.

Once the cod have spawned, the eggs are collected and taken to the hatchery, where they are incubated. After they hatch, the larvae are stocked in freshly flooded plankton ponds that have been fertilised to produce a bloom.

Harvesting takes place from February to May, before the frosts start. Yellowbelly are injected in November, once the water reaches >25 degrees Celsius and the egg stage is right for hormone inducement. Breeding teams consist of two males per female. They use one capsule of gonadotrophin hormone per breeding team. Ray has found that the smaller females are more productive and the preferred size is between 1.3kg and 1.8kg.

Males are generally half that size, although males down to 0.5kg or less can have motile spermatozoa and be running ripe. A breeding team is made up of one female to two males. The 1500iu capsule is split roughly a bit over half to the female and the remainder split between the males.

Ray feels that heavy doses are not necessary if the broodstock are well conditioned. Yellowbelly broodstock are replaced after five seasons. After injection, the breeding teams are placed in a tank and the water temperature raised to 25 degrees Celsius. After 30 hours in the post-spawning tanks, the eggs hatch, and once the yolk sac has been absorbed and the jaws of the larvae begin to operate, they are put out into the plankton ponds. This is generally three days after hatching.

Ray says that getting the eggs is the easy part. "The real part of the operation is timing the plankton bloom so it's ready for the

INSULATED PACKAGING SOLUTIONS



Latest technology and design for smarter, stronger, lighter and cost effective packaging

STYROBECK PLASTICS LTD can offer insulated packaging solutions with custom design and moulding.

- \bullet Approvals: NZ Fishing Standards, USA-FDA 21 CFR, Air New Zealand and Qantas standards.
- Product Mix: Expanded polystyrene bins, plastic trays, plastic liners, leakproof waxed cartons.
- All packaging one stop ex stock or immediate delivery.



AUCKLAND – 139 Roscommon Rd Manukau City, Phone 09 278 7175

WELLINGTON – 64 Pharazyn St Lower Hutt, Phone 04 586 0254







larvae when they're ready to feed.

"Three parts of it all are observation, observation and experience. We've had some bad years, especially in the early days. But we've got it down pretty pat now." Now they get between half and 60 percent recovery from the ponds.

Ray allows the fry grow out to between 50mm and 100mm. The ponds aren't netted, however, he feels that the small amount of natural predation only helps cull the weaker fish and runts from the batch, just as would occur in nature.

The catfish begin making their nests around the same time that the yellowbelly become gravid. Ray locates the nests in the ponds and collects the eggs, which are incubated in the hatchery. The hatched larvae are stocked in freshly flooded plankton ponds in the same way as the perch and cod.

Ray has made several interesting observations about the catfish. He stocks the breeders in ponds with the broodstock cod and perch. There can be up to eight catfish nests per pond. They breed in the broodstock ponds without any trouble, and they have even found that the male cod incubate the eggs, have driven off their opposite number, the male catfish, and proceeded to guard the

nesting site while the cod eggs hatch.

He's also seen catfish in ponds without nesting pebbles that have worked clay into balls to use as substitute pebbles.

Hatchery quality assurance is about to be introduced into New South Wales. Ray had to modify parts of his facilities to accommodate the new requirements, but he said it would bring uniformity into the industry, but he couldn't see how it would produce more fish. "In the early days it was all about encouraging development. Now it's all about regulating", he said.

Marketing takes care of itself, and Ray has built up a network of regular customers. Angling bodies in New South Wales receive a dollar-for-dollar grant for cod and yellowbelly purchases for restocking. Ray's fish are left in the ponds for 12 to 16 weeks and are quite advanced by the time they go out. They charge 25 cents for yellowbelly and 77 cents for the cod.

Time is drawing on for Ray, and production will probably stop with his generation. But the memory of his contribution will live on, particularly in the upper reaches of the tributaries of the Darling

Contact Ray Mephan on (02) 6 723 2338.

- 4. Just reward
- Kevin Mephan with a cod caught locally due to his father's dedication to aquaculture and pioneering efforts
- 5. If you think cod can't take cold weather, check out the winter frost in the Darling headwaters
- 6. An aerial view of Little Valley Elsmore



Sewage discharges from your boat can cause disease

Plan ahead where to discharge safely - fit a holding tank and use pump outs where provided.

If you have to empty your holding tank at sea, make sure you are well offshore and underway.

If you discharge you must be:

- more than 500m from shore and
- in waters more than 5m in depth and
- more than 500m from a marine farm

Check your regional coastal plan for any further restrictions.

THINK BEFORE YOU FLUSH

www.mfe.govt.nz www.maritimenz.govt.nz





The AQUATRAY® and AQUAPURSE®



The World's most Versatile Shellfish Grow-Out Systems

For Intertidal & Subtidal use with Longlines, Rails, Buoys, Rafts Pontoons and Trestles in almost any sea-state conditions.

North America (West Coast) - Taylor Shellfish Farms. Ph. (360) 426 6178 Fx. (360) 427 0327 Email: DaveD@taylorshellfish.com

North America (East Coast) - Hampton Shellfish. Ph. Cell (631) 767 7307. (631) 726 3651 Email: chipmaran@hamptons.com

U.K. - Peter Hoare. Ph. (44) 1305 87 1328 Email: oggiehoare@btopenworld.com

France - Alacarte Sarl. Ph. Portable 06 72 94 35 77. Fx. 04 67 43 27 11

Email: alacartemed@free.fr

TOOLTECH PTY LTD: P.O. Box 209 Carole Park Queensland, Australia 4300 Tel: +61 (0)7 3271 1755 ~ Fax: +61 (0)7 3271 3298

Email: tooltech@tooltechservices.com.au Web: www.tooltechservices.com.au

Telephone Roly on +64 021 786 114 for New Zealand enquires

Taihoro Nukurangi training courses in uaculture good training is the basis for successful aquaculture

- water quality monitoring
- recirculation technology
- paua farming
- fish and shellfish biology
- hatchery techniques
- fish and shellfish husbandry
- anvironmental best practice

For information on training courses: email: training@niwa.co.nz, or call: 0800 746 464.

NZQA qualifications and course subsidies for industry participants may be available through the Seafood Industry Training Organisation (SITO).

www.niwascience.co.nz/edu/training

Sational Controller Fisheries & Aquaculture



NIWA