

Student puts marine life under microscope

by Kathryn Philpott

Fieldwork has commenced on a project that may help some Auckland Maori restore what was once a plentiful fishing ground and rich shellfish gathering area.

Sarah MacCulloch, a masters student studying applied science at Auckland University of Technology, hopes her research of marine life on Nga Kuia e Toru reef will show whether this area could return to its original use.

The 24-year-old is working with the National Institute of Water and Atmospheric Research (NIWA) to examine how land use changes near South Auckland's Manukau Harbour are affecting the reef, which is located near Puketutu Island.

These changes stem from the removal of walls around large sewage oxidation ponds that treated sewage from the Manukau Sewage Works.

Built in the 1960s, the oxidation ponds stretched from the treatment

plant to Puketutu Island, creating a major obstacle for tidal movement. In 2001 the ponds were replaced by more sophisticated technology.

"They wanted to upgrade to a new ultraviolet system. The oxidation is an old method, and they've come up with new technology," Miss MacCulloch says.

"I guess some of my work will help determine if the water quality is better or worse."

Nga Kuia e Toru translates to "The Three Sisters". "There are three protruding reefs," explains Miss MacCulloch. She says the area was once important to local Maori for fishing and shellfish gathering.

"They were an important kai moana ground for the local Makaurau Marae. But once the oxidation ponds were put in seafood wasn't gathered."

Miss MacCulloch hopes her information will show whether the reef and surrounding habitats are returning to their original state. She will investigate how disturbance caused by



RESEARCHER: Sarah MacCulloch on location in Manukau.

breaching the ponds has affected the reef's biodiversity and structure.

"The biodiversity has probably

declined a lot, but that's what I hope to find out," she says.

One specific area being investigat-

ed is how changes in tidal movement are affecting the reef.

Miss MacCulloch says when the oxidation ponds were operating, slow tidal movement caused sediment to build up on the reef. After the ponds were breached, tides returned to normal and removed the excess sediment. "What's important is what the physical movement of the tide is doing."

After preparing to investigate Nga Kuia e Toru for the past six months, Miss MacCulloch has just started fieldwork to quantify life on the reef.

Every two months the science student collects benthic core sediment samples from five macro habitats: rock, oyster beds, a deep marine channel, macro-algae (seaweed) and mud.

She has collected 42 samples so far. Miss MacCulloch says she needs to analyse the samples to determine how many are needed to be accurate.

"If we don't have the correct information we don't know how to manage it properly."

Retired man busy preparing first Kiwi satellite for launch

by Sarah Stevens

A retired Whangaparaoa naval engineer is leading the design and construction of New Zealand's first space satellite.

"The Kiwisat project is to design and build, here in New Zealand, a small satellite which can be put into a low earth orbit," says Fred Kennedy of Arkles Bay.

Mr Kennedy has been working full

A symbol of Kiwi ingenuity, a piece of number eight fencing wire, may be carried on the satellite.

time on Kiwisat for two years with a team of five others from amateur satellite group AMSAT-ZL.

The group is backed by Massey University.

The satellite will be one of about 30 other OSCARs (orbiting satellites carrying amateur radio) in space.

Mr Kennedy believes that New Zealanders can complete such a large project.

"I am a man who likes a challenge. If others can do it, then why can't we?"

So far, design, construction and funding has all come from within New Zealand.

Only the launch cannot be done in New Zealand.

"The launch will be on the back of another agency putting satellites into orbit, such as NASA, or European or Russian space agencies," says Mr Kennedy.

He would like New Zealand investors to help with the \$100,000 cost of launching the satellite.

"It is a technology demonstrator." Kiwisat will experiment with new developments in the positioning and control of OSCAR satellites, and enable better control and increased power efficiency for future satellites.

A symbol of Kiwi ingenuity, a piece of number eight fencing wire, may be carried on the satellite.

He says AMSAT-ZL is also thinking about including a digitised kiwi squawk as part of the beacon that announces the satellite in space.

The solar-powered satellite is about 30cm square and will weigh between five and 10kg.

It will orbit about 800km above the earth, passing every point on the earth at least once a day.

The satellite will be controlled from a ground receiving station at Massey University.

He hopes to make the satellite accessible to "literally anyone on the globe who wants to use it".

"We can either talk through it live, if two receiving stations can see it, or it can store up messages and dump them off when Russia, for example, is in line with the satellite."

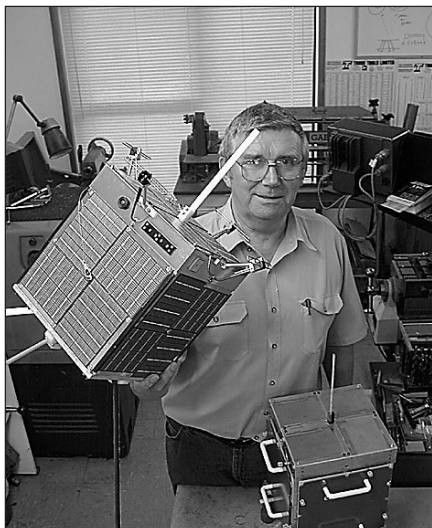
The satellite can also be used for keyboard-to-keyboard data communication, or for sending low-resolution television images.

Mr Kennedy says it is important paints and adhesives do not leach during launch, and it has been difficult to source "space-qualified materials" in New Zealand.

Chemicals can damage any satellite that Kiwisat is launched with.

"If any problems appear in pre-launch testing, a professional space agency would just send us back to New Zealand."

"It has to go through all manner of very detailed tests before we will take it for launch. It must work. It has to work."



KIWISAT: Fred Kennedy and his satellite

Laser technology set to revolutionise typing for abled and disabled users

by Amy Saunders

Computer keyboards may never be the same again.

An Auckland company called Realize Technology has developed a laser-based ergonomic keyboard that it believes has huge export potential.

More than \$US200 billion is spent globally on personal computers each year. This makes it understandable that the co-founder of Realize Technology, Chris Mulcare, is excited about the prospects of this technology.

"The premise behind it is to provide an affordable product which is simple to use, has a high level of performance and gives a disabled person the same level of access to a computer as you or I."

Mr Mulcare has spent three years researching the product, its competitors and international trends and says, "There is no other product remotely similar on the market."

Lomak offers an alternative for what a keyboard should look like and how information is put into a computer.

The keyboard can be operated in a number of ways depending on the user's disability or specific requirements.

Instead of your fingers hitting keys, your head, hand or a mouse device directs the laser at the keyboard.

Lomak was originally designed 20 years ago by electrical engineer Mike Watling.

In 2000, unable to afford a prototype, Mr Watling took his designs to AUT, which helped him to develop prototypes and prove the concept.

Realize Technology is based in Penrose and this is also where Lomak will be manufactured.

"The path wasn't obvious to me. It was a part time hobby that I was funding on my own that no one wanted to know about," says Mr Watling.

The technology is designed for people suffering severe disabilities such as tetraplegia and cerebral palsy.

Lomak will initially be launched as a product for people with disabilities who cannot use conventional computer keyboards.

Mr Mulcare says the market for

this sort of technology is fragmented and dominated by a number of small manufacturers.

He says much of the technology available is dated or rudimentary, with most products relying on pointing devices and speech recognition.

Mr Mulcare says he wants to exploit this opportunity and make Lomak the global market leader in "assistive" technology.

"The premise behind it is to provide an affordable product which is simple to use, has a high level of performance and gives a disabled person the same level of access to a computer as you or I," says Mr Mulcare.

If successful, Realize Technology will also enter the ergonomic keyboard market, which has huge growth potential, particularly given the world's ageing population and increasing computer related disabilities such as RSI (repetitive strain injury).

Lomak has been trialed and evaluated by a number of disabled users and disability professionals.

Mr Mulcare says results have been positive and indicate that Lomak is a unique product that is faster, easier and cheaper than existing technology.

Karen Elliot has researched the project for a year as part of her Applied Science Masters degree at AUT. She says results have varied according to individuals, their disability and attitude.

"It compares very well against other products. It has improved the stamina of users. They can type for longer and less effort is required."

With existing technology, disabled people can input, on average, 3 to 8.5 to 10 words per minute. With Lomak speeds of over 20 to 30 words per minute can be achieved.

James Arkwright became a tetraplegic in 1987 after a farming accident.

He says he finds Lomak much easier to use than other assistive technology such as voice recognition.

Mr Arkwright thinks it will open up a whole new world of computers for people who can't use voice recognition.

"I think it adds a new dimension to technology for people with disabilities. For people who can't use a keyboard it will revolutionise their lives," he says.

Mr Mulcare hopes Lomak will provide disabled people with one tool that can help achieve parity with able-bodied people in terms of income, employment and education.

Governments across the world are seeking to bridge the technology gap between able bodied and disabled people.

With 23 percent of Americans suffering from a disability of some sort,

President George W Bush introduced the 2001 New Freedoms Act which states that federal employers must provide disabled people the same access to the work environment as able-bodied people.

Mr Mulcare says similar trends are happening across Europe and that draws a very profitable picture for Lomak.

Of the \$US200 billion spent worldwide, approximately one to three billion is related to assistive technology.

In the US alone, an estimated three million people have impaired hands and cannot use a conventional keyboard and mouse.

Millions more suffer disabilities associated with using computer keyboards.

It is estimated that carpal tunnel syndrome costs the US \$20 billion a year.

Ergonomic keyboards currently account for four to five percent of all keyboard sales, equating to \$US500 to 750 million.

This is big business.

The New Zealand Government, through technology funding, has invested over one million dollars in Lomak, but the bulk of the money, which has made the venture possible, came from a private investor.

"It compares very well against other products. It has improved stamina of users. They can type longer and less effort is required."

Lomak will be launched in New Zealand at the end of the year and will sell for around \$NZ1500, which is less than most comparable products assistive technology.

"We could sell it for a considerably greater amount, like \$8000, but that would be going against the whole philosophy of the project," says Mr Mulcare, who knows people can only benefit from the technology if they can afford to buy it.

There are other mass market and industrial opportunities. The keyboards are waterproof so they can be used in laboratories.

Using the head and hand devices to activate the keyboard means the user does not have to be stationary or close to the computer to use it.