

Staff highlights



NIWA fisheries scientists **Dr Malcolm Francis** and **Michael Manning** are part of an international team studying the movement of great white sharks in the southwest Pacific. White shark population numbers are low. They grow slowly and have low reproductive rates. White sharks are not protected in New Zealand, and while they are protected in South Africa and Australia, it is not known whether white sharks in these areas are part of the same population.

In April 2005, Malcolm and Michael went to the Chatham Islands, along with scientists from the New York-based Wildlife Conservation Society and the Department of Conservation, to fit four sharks with satellite tags. These pop-up archival tags collect detailed information about the depth, temperature, and light levels (used to calculate position), before detaching at a pre-programmed time and transmitting the data to a satellite.



Michael and Malcolm prepare berley to attract the sharks.

Already one of the sharks, a four-metre female nicknamed Tessa, has surprised the team. By early July, Tessa was 1000 kilometres away in an area not previously known to be inhabited by white sharks.

As coordinator of New Zealand's sea-level monitoring network, **Dr Rob Bell** spent Boxing Day monitoring the New Zealand situation in the aftermath of the Indian Ocean tsunami. Then there were weeks of intensive work advising government and answering media

enquiries. Rob was also part of the reconnaissance mission to Thailand sponsored by the NZ Society for Earthquake Engineering, and the Earthquake Commission. Among the lessons for Rob: 'No single measure can provide complete protection – it needs to be a combination of early tsunami detection, robust warning-message systems, clear evacuation plans, strengthening or alternative location of critical facilities, and wise long-term planning of coastal subdivisions.'



Along with his usual swag of research and consulting projects, Rob is currently contributing to government-commissioned reports on this country's tsunami risk and preparedness, and advising Land Information New Zealand on a tsunami early warning system here.

Dr Sheryl Miller (Ngāi Tahu, Kati Mamoe, Waitaha) received a National Māori Academic Excellence Award in November 2004 for her PhD on ecophysiological aspects of *Ecklonia radiata*, a common large kelp in Doubtful Sound, Fiordland. Sheryl is working on a polyculture system with Hongoeka Development Trust to make aquaculture accessible to coastal iwi, and she's part of a team exploring the feasibility of growing seaweed as a secondary crop in mussel farms. But, while her main expertise is in seaweed, she enjoys any opportunity to get out in the field working with iwi. For instance, she's been helping with night-time surveys of eels and other mahinga kai species at Taumutu, a Ngāi Tahu rūnanga.



Water is vital to life, and a pressing issue in many parts of the world. Hydrological science has a lot to offer, but: 'often when I go to solve a practical problem that requires an estimate of how much water is available and the likely human effects on that resource, much of the relevant international research is untapped because no-one knows whether or not it applies to the catchment I need to know about,' says **Dr Ross Woods**.

Ross is one of the prime movers behind an international effort to develop useful ways of classifying and comparing catchments so hydrological research can be used more widely and appropriately. It carries the dry title of 'Theme Leader, Basin Classification and Intercomparison', which is part of the 'Prediction in Ungauged Basins' (PUB) project of the International Association of Hydrological Sciences.

As a NIWA principal scientist, Ross plays a leading role in many research projects such as creating a hydrological model of New Zealand.



When the Royal Society of New Zealand elected **Dr Lionel Carter** as a Fellow, the citation (in part) read: "Lionel

Carter, Principal Scientist, NIWA, Wellington, is a leading New Zealand oceanographer and an expert on long-term ocean change ... Dr Carter's various roles in science and project leadership have been outstandingly effective". Lionel finds this sort of thing embarrassing, but we couldn't have said it better ourselves. As one of our most experienced scientists, Lionel now spends part of his time teaching marine geology students at Victoria University of Wellington, strengthening the relationship between NIWA and the university. His current research includes a Marsden Fund project on effects of Antarctica on the Southern Ocean, in collaboration with the university's Antarctic Research Centre.

Three NIWA scientists are attracting international recognition for their work on the sandy, muddy expanses which cover most of the seafloor. In October 2004, the pre-eminent science journal *Nature*



Drew Lohrer.

published a paper by **Drs Drew Lohrer and Simon Thrush and Max Gibbs**. They showed that soft-sediment seafloor ecosystems are much more complicated and valuable than previously thought.

In their experiments, Drew, Simon, and Max manipulated a small section of seafloor habitat in Otarawao Bay, near the mouth of Mahurangi Harbour. They focused on 'bioturbators' – organisms that stir up and displace sediment while they move and feed. The group of bioturbators they studied (burrowing heart urchins) are important to the ocean's productivity because their activities stimulate the release of nutrients, which are then used by marine microalgae for photosynthesis. The research shows that loss of large bioturbators, such as through bottom trawling, can impair the performance of these often-overlooked ecosystems.

Judith McKinnel is NIWA's longest-serving receptionist. She's been the friendly and efficient voice of our Christchurch office since NIWA was formed in 1992. Judith has worked as a telephonist for 26 years, starting in the RNZAF, and says she's always liked reception work because of the opportunities to meet and help people. Then she's busy putting us in touch with another scientist once more.



At about \$70 a kilo on the domestic market, kina roe is much pricier than rock lobster, but the yield from wild-caught kina is highly variable.

Phil James works at our cold-water aquaculture facility at Mahanga Bay, Wellington. He has shown that holding kina in sea-cages with the right diet and handling can more than double their roe yield in just ten weeks, opening up a way for fishers to generate more income from the same number of animals. This research won him the Agriculture, Forestry and Fishing section of the 2005 MacDiarmid Young Scientist of the Year awards. Phil is now leading our work on kina husbandry and environmental effects, with a number of commercial partners, including Sea Urchin New Zealand.



Phil James receives his award from Steve Maharey, Minister of Research, Science & Technology.

They're the men of our little ship that could: **Captain Ron Palmer and crew** have criss-crossed the Pacific in the 28-metre *Kaharoa*. Second mate, **John Hunt**, and cook, **Mark Styles**, hold the world record for successful deployments of 'Argo' floats. These high tech devices are providing detailed measurements of the upper ocean around the globe.

'For me, *Kaharoa's* a perfect ship,' says John Hunt, 'unless we're going straight into the weather when things can get a bit rough.' They're off again in October 2005 for an epic voyage across the south, central, and northeast Pacific. *Kaharoa* will not return to Wellington until mid March 2006.

NIWA's involvement in the Argo programme is coordinated by marine physicist, **Dr Phil Sutton**. It's thanks to his association with Scripps Institution of Oceanography, San Diego, that Scripps and the University of Washington, Seattle, initially chartered *Kaharoa*. Now the vessel and crew have well and truly proved their worth.



Home at last: John Hunt, with his wife Paula, after three months at sea. So far, John has deployed over 200 Argo floats on voyages to Chile, Peru, and Tahiti.

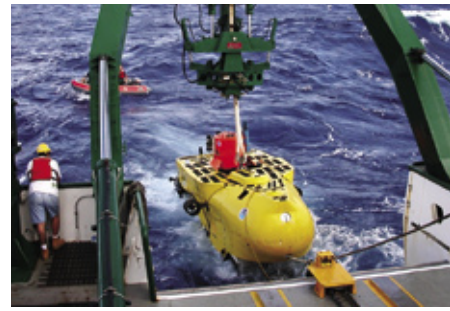
great staff

Staff highlights

In January 2005, **Dr Barbara Hayden** was appointed to the newly established Biosecurity Ministerial Advisory Committee. The 13-member committee provides the Minister of Biosecurity with independent advice on how the biosecurity system is performing. Barb is one of our principal scientists. She leads the National Centre for Aquatic Biodiversity and Biosecurity, and a multidisciplinary research programme on sustainable aquaculture.

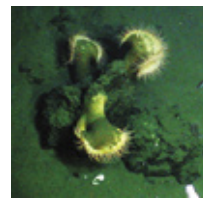


NIWA scientists have been diving to explore undersea volcanoes between Tonga and the Bay of Plenty. The hot, sulphur-rich vents in these volcanoes sustain unique and complicated ecosystems. In April–May 2005, a multidisciplinary team of New Zealand and American scientists used the submersible *Pisces V* to study them first-hand.



NIWA geologist **Dr Ian Wright** contributed his expertise in hard rock geology, while biologists **Drs Malcolm Clark, Ashley Rowden, and Alison MacDiarmid** handled most of the study of 'macrofauna' (animals you can see with the naked eye).

Pisces V is owned and operated by the University of Hawaii. Ian, Malcolm, Ashley, and Alison were working with scientists from the Institute of Geological & Nuclear Sciences, the US National Oceanic and Atmospheric Administration, and the University of Mississippi.



Dr Andrew Jeffs has been listening to curious tunes. He was one of the authors of a paper published in the prestigious weekly *Science* in April 2005. It showed for the first time that reef fish not only use the clicks, pops, and clacks emanating from underwater reefs to find places to settle, they also discriminate between sounds.

Andrew worked with Professor John Montgomery, director of the University of Auckland's Leigh Marine Laboratory, and a number of international collaborators. Their experiments on the Great Barrier Reef used an innovative underwater speaker system which Andrew developed for broadcasting imitation reef noises, such as snapping shrimps and fish calls.

Andrew and his colleagues have used this equipment to show that larval crabs and rock lobsters are probably using reef noises to find their way back to the coast. Understanding this behaviour and pinpointing the acoustic cues even more precisely will help in active management of reef fish.

Dr Janet Bradford-Grieve retired from NIWA in November 2004, but we still see a lot of her because she retains an emeritus role with us. Janet has devoted much of her professional life to studying calanoid

copepods – small aquatic crustaceans. These plankton are an important food source for many larval fish. Janet is also a strong advocate of interdisciplinary science, and enjoys integrating the work of biologists, ocean chemists, sedimentologists, and physical oceanographers to get a better

appreciation of how whole systems operate. She was elected a Fellow of the Royal Society of New Zealand for her work as a leading New Zealand biological oceanographer and world-leading copepod taxonomist. Now she's retired, she's got a stream of younger scientists asking her to review their manuscripts – which she's happy to do, 'provided they take notice'.



Professor Carolyn Burns, NIWA Board member and President of the Academy Council of the Royal Society, formally recognises Janet's election as Fellow at a function on Tangaroa.

They're world-renowned atmospheric scientists, but few New Zealanders have ever heard of them or the tiny Central Otago township of **Lauder** near where they work.

You'll usually find 16 permanent staff and a handful of international students and visiting scientists at NIWA's atmospheric research station about a kilometre outside Lauder. This little group has a big reputation.

To take one example: five Lauder scientists are invited authors on chapters of the 2006 Scientific Assessment of Ozone Depletion from the World Meteorological Organization and the UN Environment Programme. This is the authoritative scientific assessment on ozone, and very few other organisations in the world have as many invited authors.

Lauder's clear skies make it ideal for high precision atmospheric measurements, and there's a strong spirit of cooperation on global projects. Lauder is, for instance, the only fully equipped site in the southern hemisphere mid latitudes in the international Network for the Detection of Stratospheric Change (looking at ozone and other gases in the stratosphere, between about 50 and 100 km up). It is also one of just four charter sites worldwide in the global Total Carbon Column Observing Network (measuring carbon dioxide and other greenhouse gases through the whole atmosphere).





When **Dr Stu Hanchet** is not doing fisheries-related research, or kitesurfing off a Nelson beach, he convenes one of two working groups for the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). Stu's role as convenor of CCAMLR's Fish Stock Assessment Working Group requires him to collaborate with scientists from the 26 member states and the secretariat based in Hobart. The international meetings on the complex business of assessing the stocks of toothfish and icefish can take all the skills of a diplomat, especially when you throw in political agendas and questions of illegal, unregulated, and unreported fishing and the like.

Dr David Wratt leads NIWA's National Climate Centre, but he is also the only New Zealander on the Bureau of the Intergovernmental Panel on Climate Change (IPCC). The IPCC was set up by the World Meteorological Organization and the United Nations Environment Programme in 1988, and almost every country in the world belongs. The IPCC produces regular assessments of the current state of knowledge on climate change. These assessments involve hundreds of experts and are highly influential.



David is one of three representatives of the Southwest Pacific on the 30-strong Bureau. 'The Bureau is a bit like a board of directors for the IPCC', David explains. They have the crucial job of selecting leading scientists to write sections of the reports. They also ensure the lengthy process runs smoothly, including extensive review by other scientists and governments.

Dr Julie Hall is the first woman to lead the development of a new project within the International Geosphere-Biosphere Programme. The IGBP looks at the effects of global-scale problems and attempts to understand how the 'Earth System' works; for example, the links between land, ocean, and atmosphere. Julie's work brings together scientists from 37 countries with administrative support based in France. The topics are enormous,



such as the impact of fishing on the food web – in Julie's words, 'from viruses to walrus'. The research will take the next 10 years. This is just one of half a dozen international positions held by the busy ocean scientist. Julie also coordinates NIWA's work in science education.

Ian Maze likes to spend as little time as possible sitting in the office. Ian leads our Dunedin-based field team, and has some 36 years of field experience. His four-strong team does just about anything – from monitoring hydro lakes, to surveying ports, to maintaining NIWA's climate and hydrological networks.

Modern technology means data from most of the remote stations can be relayed automatically by radio, cellphone, or satellite link. However, the team still has to collect river flow measurements, maintain and inspect field equipment, and undertake special projects in all conditions.



Says Ian, 'It can be bleak out there, but we've got the right gear.' And it beats sitting in the office.

Ian Maze (right) helps Dr Michael Reid collect sediment samples from the bottom of Lake Gunn, Southland, to study the effect of different nutrient levels on diatom species.

'It's all about spending time with people, listening, and responding to their needs,' says **Dr Michelle Kelly** of her work with the people of Makaurau Marae, Ihumātao, Manukau.

Until about three years ago, the marae's taonga kai moana reef, Ngā Kuia e Toru, was covered by a thick layer of mud and Pacific oysters. After 40 years of circulation changes, the Mangere Sewage Treatment Plant oxidation ponds have been removed and the reef is now in recovery mode.

Michelle has been working with the marae's kaumatua, tamariki, and parents, to help them get reacquainted with the animals and plants on their recovering reef.

One of Michelle's most recent projects is this poster for schools, featuring a hikoi wananga (field trip) held in 2004 to learn about the reef.



In just four months this financial year, **Lou Reddish** watched well over 100 000 cars go by. Lou is the main operator of our remote sensing equipment for vehicle

emissions. The technology uses beams of light to measure exhaust pollution in real life driving conditions.

Lou's got used to the 5 a.m. starts needed to survey rush hour traffic, but we do give him the occasional break from endless car-watching. This year has seen Lou working on temperature and wind speed sensors in the depths of Waitomo Caves and at the top of the Sky Tower in Auckland, and counting recreational fishing vessels from a light plane, as well as other air quality projects.



great staff

Education & Training

NIWA is committed to the promotion of science in schools and universities and to the general public.

Our school sponsorship centred on three key areas: Regional Science and Technology Fairs and the national 'Realise the Dream' event, the Teacher Fellowship scheme, and the Discovery Room at Kelly Tarlton's.



Winner of the Wellington fair Simon McVeagh discusses his project 'Why girls should not swim in Evans Bay' with judge Lionel Carter.

We are the major sponsor for **Regional Science and Technology Fairs** in Auckland City, Waikato, Bay of Plenty, Wellington, and Nelson, and we assist with sponsorship of the Central Northland, North Harbour, Taranaki, Marlborough, Central South Island, South Canterbury, and Otago fairs. These sponsorships promote science in secondary and intermediate schools and to the community at large because parents invariably outnumber students at the fairs.

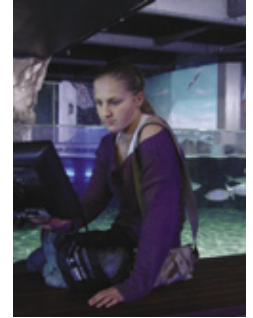
Our linkages with universities through the joint postgraduate **Centres of Excellence** with the Universities of Auckland (Institute of Aquatic and Atmospheric Sciences (IAAS)), Canterbury (Centre of Excellence in Aquaculture and Marine Ecology), and Otago (Centre of Excellence in Chemical Oceanography) produce postgraduates in areas we require for core science. Of particular significance this year was the initiation of a closer relationship with Victoria University of Wellington, particularly in areas of marine science.

Our staff supervised 55 **postgraduate students** in six universities, 48 at PhD level. We provided two PhD scholarships, and several of our supervised students have received funding from the Foundation for Research, Science & Technology's Enterprise Fellowships, Tūāpapa Pūtaiao Māori Postgraduate Fellowships, or Bright Futures Fellowships. In many cases we also provide infrastructure and operational support.

We also funded 11 **postdoctoral fellowships** in areas where we need a rapid input of high quality expertise. These included water allocation, marine biosecurity, biodiversity, aquaculture, water resources, oceanography, and simulation modelling.

Our association with the Royal Society of New Zealand's Science, Mathematics, and Technology **Teacher Fellowship** scheme continued with our hosting of two Teacher Fellows working on stream water quality. We also helped develop and provide ongoing support of the SEREAD project, which developed teaching resources on weather, climate, and sea level rise for use in Pacific Island schools.

We continued our sponsorship of the marine educational facility, the **'NIWA Discovery Room'** at Kelly Tarlton's Underwater World in Auckland. This gives children the chance to watch an octopus, identify sea life in the touch pool, and discover secrets of the marine world. More than 42 000 children visit the NIWA Discovery Room each year during school visits alone. The new children's interactive room at Kelly Tarlton's was also developed with our assistance.



We provided **educational opportunities** for capacity building within NIWA with sabbatical leave grants for two senior scientists, and three technical training awards in overseas institutions.

In public education, we offer a wide range of sponsored and self-funded training courses within our core areas to assist in the professional development of staff in regional councils, government departments, and consultancy organisations. These courses transfer NIWA's technology and information to users. We ran 13 training courses this year, including a new initiative in aquaculture training in conjunction with the Seafood Industry Training Organisation (SITO). Others included the popular freshwater biodiversity courses on topics such as native freshwater fish, wetland plants, and aquatic invertebrates.



Steph Parkyn shows a Waitete landowner how to measure water clarity in a community stream restoration project.

NIWA's Executive team



Rob Murdoch, Bryce Cooper, Rick Pridmore, and Mark James.

Rick Pridmore, Chief Executive Officer

Rick became Chief Executive Officer of NIWA in August 2002 after having served as Deputy Chief Executive (Strategic Development) and Research Director of NIWA. Born in the USA, Rick came to New Zealand in 1976. He completed his PhD at the University of Otago in 1980, and from 1980 to 1993 he worked as a government scientist, specialising in marine and freshwater ecology.

Bryce Cooper, Director, Strategic Development

Bryce has a PhD in microbiology and is a graduate of the London Business School Senior Executive Programme. He has held research leader and Regional Manager roles in NIWA, and is currently responsible for overseeing NIWA's strategic initiatives, including commercialisation of research, NIWA Australia, and partnerships with Māori, government agencies, and industry.

Mark James, Director, Operations

Mark completed his PhD in aquatic ecology at the University of Otago, and has spent 20 years as a scientist specialising in lake and coastal ecology research and consulting. In 2000 he moved from Christchurch to Hamilton to take up the position of Regional Manager, NIWA, Hamilton, and was appointed as NIWA's Director of Operations in September 2003.

Rob Murdoch, Director, Research

Rob has a PhD in marine science from the University of Otago and has specialist interests in oceanography and marine ecology. He held the positions of research leader and Regional Manager at NIWA in Wellington before taking on roles overseeing NIWA's strategic research and NIWA Vessel Management Ltd.

General Managers John McKoy, Charlotte Severne, Clive Howard-Williams, Murray Poulter, Andrew Jeffs, and Don Robertson.



Clive Howard-Williams, General Manager, Freshwater & Coasts

Clive is an aquatic ecologist with a PhD from the University of London. He was a research scientist at the Max Planck Institute for Limnology, has specialised in research on water quality, water plants, and wetlands, and has a wide interest in freshwater degradation and change and in Antarctica. He is a Fellow of the Royal Society of New Zealand, and an Adjunct Professor at the University of Canterbury.

Andrew Jeffs, General Manager, Aquaculture & Marine Natural Products

Andrew has a research background in marine ecology and aquaculture, with a strong interest in applied research. He has a PhD from the University of Auckland and worked as a scientist for the Cawthron Institute and the Department of Conservation before joining NIWA eight years ago.

John McKoy, General Manager, Fisheries

John is a marine zoologist with a PhD from Victoria University of Wellington. He has contributed in a range of roles to fisheries research in New Zealand since 1973, in MAF, MAF Fisheries, and, since 1995, NIWA. He has worked in crustacean and molluscan aquaculture and fisheries biology in New Zealand, Australia, and the Pacific.

Murray Poulter, General Manager, Atmosphere, Natural Hazards, & Energy

Murray has a PhD from the University of Canterbury and worked in England and Germany on wave propagation in the atmosphere and space. He returned to New Zealand where he applied radar methods to determine the role of ocean waves in coastal and air-sea interaction processes, working in New Zealand, Canada, the USA, and Antarctica, before taking on a management role in NIWA.

Don Robertson, General Manager, Biodiversity & Biosecurity

Don holds a PhD in marine biology from the University of Otago and has spent much of the last 30 years in marine fisheries research, including deepwater fisheries around New Zealand, and Antarctic marine resource management. He has had roles in marine science leadership, regional management, and information services in MAF Fisheries and NIWA. More recently, Don took on the lead role for NIWA's marine and freshwater biodiversity and biosecurity research and services.

Charlotte Severne, General Manager, Māori Development & Oceans

Ka pāwaha te tai nei, hoea tātou

I raro i te maru o ngā maunga hakahaka, ngā awa teretere me ngā tūpuna, kua whetūrangitia o ngā motu e rua, tēnā rā koutou katoa.

Tēnei te mihi tioriori o Taiharonukurangi ki ngā iwi huri noa i te motu. Ko Charlotte Severne tōku ingoa. Ko ahau tētahi o ngā uri o Tūwharetoa me Tūhoe Potiki. Heoi anō ko taku nei tūanga, ko ahau te kaiwhakahaere Māori o roto o NIWA whānui tonu me tō mātou nei roopu rangahau Māori, e kiia nei ko Te Kūwaha-o-Taiharonukurangi. Ko te tino kaupapa o Te Kūwaha hei tautoko i ngā tūmanako, wawata o te iwi Māori.

