

# Staff highlights



## Helping control didymo

Finding a potential control tool for didymo has been an exciting and satisfying challenge for **Dr Sue Clearwater**, project leader for the control study. The team has found a copper-based compound that can control early stage infestations of didymo.

"The cooperation between NIWA staff and other organisations has been immensely satisfying. And the depth and breadth knowledge in this organisation is amazing," she says.

Didymo became a high profile invasive pest because it forms extensive and ugly algal mats, and many interest groups are pushing hard for a solution to its invasion. Sue says New Zealand is now a world leader in didymo control.

## Talk about the weather

Climatologist **Stuart Burgess** has a wealth of climate information at his fingertips, in the form of NIWA's national climate database.

Each month, Stuart uses the data to produce the national climate report (a hit with the media), detailing the recent climate (wetter, drier, sunnier, colder than normal) and major weather events.

With years in the job, Stuart is adept at analysing climate information, producing client reports on potential hazards, such as floods and tornadoes, and appearing as an expert witness in court cases.

One of the biggest challenges? "Keeping up with the weather – hardly a month goes by without heavy rain or damaging winds."



## The best of both worlds

**Marty Flanagan** has the best of both worlds – maintaining near real-time telemetry networks from the office and getting out into the backblocks, with the Christchurch field team, servicing hydrometric equipment from Rakaia to Kaikoura and Craigieburn to the Chathams. The team also run large commercial hydrometric networks for the Christchurch City Council and irrigation companies.

"You have to be good at a lot of things, not just the science. You need practical abilities and technical knowledge to work in



marine, freshwater, and alpine environments with the various technologies we use." And he can now add the Pacific to that list because he'll be part of a team installing a flood warning system in Fiji over the next few months.

"I just love the variety," he says.

## Breaking the ice

The year's highlight for NIWA's dive training and safety officer, **Steve Mercer**, was a 10-day polar diving workshop at a Norwegian research station (next stop, the North Pole).

The ice was broken with a few dives and a review of safety and training standards. Despite diving's high-risk reputation, the biggest concern was the local polar bear, who pitched up on the first evening (and fortunately left without mishap).



NIWA has about 70 diving staff. Safety standards are high, and despite an average of 3000 freshwater and marine dives a year (from Antarctica to the Spirit Islands, Northland), the incident rate is very low.

Steve also dives with the paua assessment team off Fiordland and Stewart Island.

## Managing the payroll

As the payroll manager for NIWA, **Shareen Sharma-Prasad**, is responsible for ensuring 730 scientists, technicians, crew members, and other staff are paid accurately and on time.

The biggest challenge is working with staff who spend as much time in the field or at sea as at their desks. This means taking account of things like seagoing rates and overtime allowances as well as being on top of the terms and conditions of the various unions covered at NIWA.

"It's a very demanding role, with non-flexible deadlines, which keeps me very busy, but it does have a lot of variety," says Shareen.

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## Hydrology for hydroelectricity

**Barry Waugh's** expertise in hydroelectricity industry hydrology is being used in three new hydro development projects in the Philippines. A foundation member of NIWA, he provides hydrology services for several hydroelectricity companies in the central North Island.

"Having worked in hydrology in New Zealand for 37 years, now helping to shape the future of hydrology in the Philippines is very rewarding," says Barry. The Philippines has many small schemes, as opposed to New Zealand's fewer larger schemes, and presents very different challenges in terms of the need to provide not only energy, but also water supply and irrigation systems.



A specialist modeller, Emily is working with local bodies on predicting tsunami inundation, which will help with forecasting economic effects as well as potentially saving lives. David is looking at offshore tidal power generation possibilities for New Zealand power companies. He is also working on assessing the impacts of aquaculture structures on tidal flows, and on a range of more experimentally-based research projects.

"Our work uses science to solve practical problems," says David.

## Sashimi, with a little soy

**Dr Peter Lee's** job ranges from ironing out hatchery problems facing groper to judging the best entries in the latest NIWA science and technology fair.

As science leader at NIWA's Bream Bay Aquaculture Park, Peter works with the aquaculture team developing strategic research and commercial plans, new research programmes,



and supervising postgraduate students. He also works closely with Te Kūwaha to bring aquaculture to Māori.

His biggest project aims to commercialise new aquaculture species. Kingfish have thrived, while groper, kina, lobsters, and eels are still poised to grow. "The potential for aquaculture in New Zealand is huge", says Peter, "with a great coastline, climate, and water conditions."

His recommendation for kingfish: "Serve as sashimi, with a little soy and wasabi. Fantastic."

## So, what do you really mean?

"It's fascinating the way the world works", says NIWA science journalist **Michele Hollis**. "In this job I can tap into answers to questions like 'why does that happen?' 'how do you know that?', or 'what if?', and I can pass that knowledge on."

Her day is spent writing and distributing media releases, newsletters, and reports about what's happening at NIWA, as well as organising media interviews with scientists. "I tell them we're striving for clarity and humanity, not excess simplicity."

Michele's highlight of the year: "publicising the Intergovernmental Panel on Climate Change reports."



## Modelling in Antarctica

"The best science enables fisheries managers to make well-informed decisions", says fisheries modeller, **Alistair Dunn**. His work on the Ross Sea Antarctic toothfish, which has become a popular target for fishers in recent years, is a case in point.

Using observations from catch, effort, and tagging, Alistair developed a new integrated population model for the toothfish.



The model has been so successful that the Commission for the Conservation of Marine Antarctic Living Resources has adopted it to set sustainable catch levels for both the Antarctic toothfish and its neighbour, the Patagonian toothfish.

When not working on toothfish, Alistair puts his modelling skills to use on species such as hake, Bluff oysters, and longfin eels.

## Blending science with commerce

Hydrodynamic modellers **Drs Emily Lane** and **David Plew** are blending science and commerce using the RICOM model to work on a wide range of scenarios that have the potential to save a lot of money and lives.



## Forecasting floods

**Dr Martyn Clark** regards his key innovative contribution to NIWA as the development of the flood forecasting methods used in NIWA's EcoConnect environmental forecasting system.



"Our flood forecasting methods are among the most advanced worldwide, but we're dreaming if we expect to get the forecast exactly right all of the time. We must be honest about our uncertainties, and provide forecasts of the probability (or chance) that a river will rise above critical levels, providing early warning for emergency managers and opportunities to protect lives and property."

Martyn is one of the key scientists involved in an international effort to quantify and reduce uncertainties in hydrological predictions.

## Working with industry

**Keith Michael's** expertise is in shellfish, from the iconic Bluff oyster to the latest delicacy, the surf clam.

As a fisheries scientist with 30 years' experience, Keith says that these times are exciting. Scientists are working across disciplines to build holistic views of the marine world and are engaging more successfully with industry about science and its value.

The 140-year old oyster and fledgling surf clam fisheries are good examples of collaboration, with NIWA scientists and industry working on research projects designed to ensure the ongoing sustainability of the shellfish stocks and minimise damage to their environment.



For Keith, it's meant a lot of meetings and time on the oyster boats working with the fishers.

## Illustrating science

For graphic designer **Erika Mackay** it's all in a day's work, but the range of her output is astounding.

Erika produces conference posters, flyers, report figures, banners, and presentations for NIWA scientists in the Wellington region.

There's a strong science bent to her career; she spent five years at Te Papa (where she produced 450 hand-drawings of fish) before joining NIWA in 2001. These days, Erika is extending her skills by moving into multimedia and animation. We hope she'll keep producing those beautiful Antarctic posters as well.



## Using cameras instead of observers

**George Payne** has found a way around thousands of hours of often cold and damp field observation. To achieve his innovative Cam-Era system for monitoring beach environments, George has adapted high speed, high resolution digital cameras to a form of time-lapse photography that reports electronically.



This allows evaluation of the effect of normal and storm waves on any beach, determination of what is happening to the neighbouring sea floor, and construction of a relief map of the tidal area by averaging wave movement at set periods.

To date, Cam-Era has been installed at Lowestoft, UK, and near Bordeaux in France, as well as several New Zealand locations. Environmental monitoring is the main application at present.

## From snowmelt to stormwater

Innovative stormwater management in urban environments is already having an impact on reducing stormwater flows, and modeller **Dr Annette Semadeni-Davies** is keen to ensure this work is taken into account when she is assessing the potential impact of future climate change.

Traditional underground urban stormwater systems may not cope with the predicted increased rainfall. But trends here and overseas are towards open-water systems, such as plantings, ponds, and wetlands, which may reduce flood risk while improving water quality.

She is currently working on a GIS urban sediment and containment load model with colleagues in Auckland and Hamilton.

She returned to New Zealand after 12 years in Sweden, where her work on urban snowmelt was internationally recognised.



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## Helping save lives

### Dr Michael Uddstrom

leads a team of more than 25 scientists, IT staff, and international collaborators who are creating an integrated, all-hazards forecasting system which can

predict where serious hazards – such as high waves, coastal inundation, river floods, and tornadoes – are expected, up to 48 hours in advance.

The unique system uses NIWA's supercomputer to process a vast array of real-time data from sources including satellites, weather balloons, and ships.

The seven-year project has been absorbing, says Michael, with collaborators often sharing information well into the late hours.



## Making a difference

**Bruce Hartill** has spent a lot of time in small planes in recent years, estimating the nature and extent of the recreational fishing harvest and its consequent impact on the marine environment. It's an extensive and under-researched issue, but one which is central to the sustainable management of inshore fisheries.

There is wide interest in the work; partly because of ongoing debate about the allocation of inshore fisheries between commercial and non-commercial interests, and partly because it is hard to assess the state of these resources when a large part of the harvest is unknown.

Bruce gets much satisfaction from tackling such an important question and from the fact that NIWA's work does really make a difference.

## Keeping staff safe

Keeping NIWA's staff safe at all times, given their huge variety of activities, locations, sites, and occupations, is **Jenny White's** challenge – in offices, tramping on the mountains in

snow, driving over very rugged terrain, collecting samples from fast-flowing rivers.



Jenny takes an active interest in safety by working to ensure all staff have the right training and skills to work efficiently and safely, according to NIWA's established guidelines, and that everyone's safety is monitored through procedures such as set reporting times for

field staff when they are in the field. Jenny is justifiably proud of her role in ensuring that NIWA maintains an outstanding safety record.

## From mudflats to seamounts

Swapping intertidal mudflats in Scotland for the marine life on seamounts in some of the world's deepest waters doesn't phase NIWA scientist **Dr Mireille Consalvey**.



She moved to Wellington from St Andrews two years ago, to coordinate the research of 16 scientists from 11 countries for the Census of Marine Life seamounts project, CenSeam.

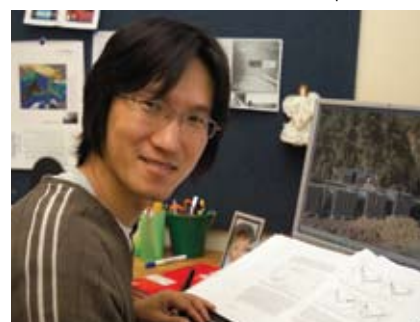
One of the highlights is going to sea. "It's a real privilege. Amazing to see parts of the seafloor which have never been seen by humans before."

Although apolitical, the CenSeam reports are already feeding into international negotiations on issues such as bottom trawling on the high seas.

## Potential solution to rural effluent

The continuing debate over dairy effluent may be defused by environmental engineering being carried out by **Jason Park** and colleagues here and in his homeland, Korea. A joint project on high grade wastewater systems for urban areas will hopefully be able to be scaled down and the technology used at farm level.

GNS Science, the University of Auckland, NIWA, and their Korean counterparts are working on optimising and converting a high tech Korean wastewater treatment system to New Zealand conditions. The up-flow multilayer bioreactor



is about 25% more efficient than traditional systems.

## Using scents to lure fish

Being a fish pheromone expert might cause sideways looks at a barbecue, but **Dr Cindy Baker's** work is essential for the preservation of endangered species and the control of exotics. Establishing the right scent to lure exotic freshwater pests to a kill zone will hopefully help control the predatory European perch which is decimating native populations of several species.



Cindy is also establishing, through water samples, which streams have signature migration cues, and hopes to use the same pheromones to attract rare native species to other suitable breeding waters.

It's practical, satisfying, and quantifiable science, she says, with the potential to make a significant difference to New Zealand's environment.

## How long will it take for that reservoir to fill ... with sediment?

The geomorphic behaviour of rivers and coastlines sounds a bit abstract, but it has direct impact on society and commerce.

**Dr Murray Hicks** predicts the long-term

effects of dams and water-storage schemes, addressing questions such as "How long will it take a reservoir to fill with sediment?" and "How much erosion will occur in the riverbed and along the coast downstream of a dam?"

His current big project is the \$1 billion North Bank Tunnel for the Lower Waitaki, Meridian's next big hydrogeneration proposal. The demand for river water to irrigate dry areas like Canterbury will have Murray forecasting effects for many years to come.



## Ka pūwaha te tai nei, hōea tahi tātou

Helping NIWA develop and maintain successful collaborative partnerships with iwi, hapū, and Māori organisations is a core responsibility of Te Kūwaha, NIWA's Māori research and development team. Group manager, **Erica Williams** (Te Arawa, Ngāti Whakaue, Ngāti Pīkiao, Te Whānau a Apanui) says it's all about delivering science excellence for the benefit of Māori.



"One of our key focuses is to improve the communication of NIWA science to Māori, as well as increasing the capability of the wider NIWA staff to interact effectively with our Māori partners, but top of my list this year has been finishing my PhD on the effects of polycyclic aromatic hydrocarbons on hanikura (*Macomona liliana*)", says Erica.

## Taking stock to determine the future

Marine scientist **Dr Alison MacDiarmid** is leading a team of 25 scientists from 11 institutions in a bid to track 1000 years of climatic change and human impact on New Zealand's marine ecosystem.



"The 3-year 'Taking Stock' project, launched last year, aims to put a historic perspective on where our marine ecosystem is now so we can better plan its future," says Alison.

The team is gleaning information from archaeological, historical, biological, climatic, and geological records. These clues will be pieced together into

five snapshots (computer models) depicting the marine ecosystem in 1000AD (before human intervention), 1450, 1790, 1945, and the present day.

## Calling on Mr Supercomputer

**Chris Edsall's** supercomputer skills can help transform reams of data into top class weather and environmental forecasts, as well as projections for climate change.

Chris oversees the running of NIWA's Cray T3E supercomputer. It's unique in New Zealand, takes up a small room and has the computing power of 500 personal computers cabled together. "It's the interconnections rather than the megahertz which count", says Chris.



The supercomputer takes less than one hour to transform high-resolution satellite, radar, aircraft, and other data into a 36-hour forecast.

"But its size and uniqueness has its challenges; you can't practise on your

computer at home, and it sure generates a lot of heat," says Chris.

Special congratulations to emeritus NIWA scientist **Dr Janet Grieve**, who was appointed an Officer of the New Zealand Order of Merit in this

year's Queen's Birthday Honours for services to marine science. Janet is New Zealand's foremost authority on marine copepods (small crustaceans). She has devoted her career to studying copepod diversity, ecology, and life history, and investigating the biological and physical processes that drive ocean productivity.

