NIWA

ANNUAL REPORT
2012/13

Enhancing the benefits of
New Zealand's natural resources

Q

How is NIWA helping to sustainably manage New Zealand's precious freshwater resources?

Pure freshwater is the lifeblood of New Zealand's society and economy, and a key contributor to our reputation as a clean, green nation. But demand – to generate electricity, irrigate crops and pastures and quench the thirst of New Zealand homes and businesses – is accelerating rapidly. There is also uncertainty about how much water will be available as our climate changes. Sustainable management of this precious resource has never been more important – or challenging.

NIWA's science focuses on understanding how much, where and when freshwater is available – and how that may alter as our climate changes. We explore how different water and catchment land uses affect downstream water availability and quality, and design methods for preventing incursions by contaminants, pest fish and invasive weeds. We also research methods for restoring polluted water to health.

We use the data and knowledge we acquire to design models and tools that help a wide range of New Zealanders better manage their interactions with freshwater.

COVER IMAGE
Canterbury-based NIWA Senior Environmental Consultant Graham Elley helps to design tools that automatically monitor and control the amount of freshwater taken for irrigation.

IMAGE: *Dave Allen*

How is NIWA helping to develop a National Oceans Strategy to manage New Zealand's marine estate?

A: New Zealand's Exclusive Economic Zone and Legal Continental Shelf cover 5.7 million square kilometres of ocean, more than 20 times our land area. Enhanced stewardship of this vast marine estate is essential to ensure increased economic returns from marine resources while maintaining ecosystem integrity and biodiversity. Knowledge from NIWA's marine science – which includes marine geology, geophysics, physical oceanography, hydrography, marine energy, fisheries, biodiversity and biosecurity – will be needed to underpin a National Oceans Strategy. Much of our marine research is undertaken onboard *Tangaroa* – New Zealand's only deepwater research vessel, and a key science asset, fundamental to increasing our understanding of our marine estate.

Dave Allen

NIWA Annual Report 2012/13

Chris Mace (Chairman)
John Morgan (Chief Executive)

Bruce Jarvis

Realising economic and environmental prosperity

When Science and Innovation Minister Steven Joyce announced the Government's 10 National Science Challenges earlier this year, he said "our science system is an important part of our economic and people-to-people linkages to the wider world".

He added that the Challenges would help "New Zealand to become a bigger player in the identified areas of work, and provide opportunities for innovation and business development on the world stage". He was reiterating the Government's focus on science and innovation to grow New Zealand's economy and international competitiveness – both by actively investing more than $1.3 billion in research and development, and by ensuring science is undertaken in a more strategic way by focusing research on those issues at the forefront of New Zealanders' minds.

Two particularly pleasing aspects of the development of these Challenges, from NIWA's perspective, were the involvement of the public, through the very successful and engaging Great New Zealand Science Project campaign, and the strong collaboration between science organisations and across science disciplines. The selected Challenges show very clearly that many of the issues that matter to New Zealanders – issues that we are all facing – are issues NIWA's research and science can help address. Issues like protecting and managing our biodiversity, improving our biosecurity, increasing our knowledge of, and resilience to, natural hazards and extreme weather, and understanding more about how the Southern Ocean and Antarctica will influence our future climate are large and complex.

They require us to work out how we can enhance the economic benefits of our natural resources – through primary sector production and marine exploration, for example – in a sustainable way, so future generations can also enjoy their benefits. It won't be easy, but by drawing together the best expertise in New Zealand to help, we can have a profound impact on our country's economic prosperity and provide the opportunities for innovation and development on the world stage that Minister Joyce seeks.

Earlier this year, 16 NIWA staff members took part in the first National Science Challenge workshops. The workshops helped define the scope of each Challenge, by identifying key research components required to deliver identified outcomes, and ways to align these components with existing research activities and capability. Participants also looked at where funding could be used to help achieve the Challenge outcomes, potential multi-disciplinary and inter-organisational partnerships and how to start developing more detailed research plans. NIWA is proud to have been involved in these initial workshops and looks forward to further involvement and collaboration with our colleagues in the coming months.

Traditionally, a New Zealander's 21st birthday is an important milestone; a celebration of age and the future. The same can be said for NIWA, as we embarked on our 21st year of operation this year. Since our inception in 1992, NIWA has changed substantially, in anticipation and response to both internal and external decisions and influences. Some of our most profound changes have been required in the last few years, as we saw and felt the impact of the global financial crisis. These years have not been easy, but in order to develop our business and respond appropriately to the demand for our scientific expertise, we have had to remain agile.

We have implemented new strategies to ensure NIWA retains the appropriate capabilities and assets to meet the country's, and our customers', science and innovation needs, while using our resources wisely. To help support our science and technology transfer, we continue to invest in new, technology – providing our staff with world-class equipment and technologies to ensure we are all operating in the most efficient and effective way.

By adapting quickly and responsively, we have performed positively again this year, and we are starting to see signs of a return to growth in the demand for our science. As a result, I am delighted to confirm that NIWA will be paying a dividend of $2 million to the Government this year. Through continued prudent management and focusing our efforts on growing revenue opportunities, the Board of Directors is confident we will continue to meet our responsibilities, as outlined in our Statement of Core Purpose, this coming year.

I offer my personal thanks to my fellow Directors, John Morgan and his Executive Team, and the rest of the NIWA team for their commitment and hard work over the last year. It has been another busy and challenging period, but also a rewarding one. We can all be proud of NIWA's significant achievements. I have no doubt, through the delivery of world-class environmental research and applied science, we will continue to make an important contribution to New Zealand's economic and environmental prosperity in the coming year.

Chris Mace
Chairman


Chief Executive John Morgan with Energy and Resources Minister Simon Bridges, on the bridge of RV Tangaroa.

Dave Allen

Well-trimmed, focused and on course

I'm no Olympic sailor, but I've spent enough time on the water to know that a well-trimmed yacht will be better balanced, easier to handle, sail a course more successfully and be, quite frankly, more exciting to run. It is the same for business. You need to be agile and able to respond to the environment around you quickly and strategically, but you also need to be streamlined and focused on the goal ahead.

In our 21st year of business, NIWA has had these thoughts very much front of mind. We remain focused on two primary goals – growing revenue opportunities by working closely with our main sector customers, and managing our resources prudently. We have continued to change our structure and operations to ensure we maintain the appropriate capabilities and assets to meet the demands for our research and applied science services, whilst reducing costs and waste. We have made some changes at our Lauder site, in Central Otago, so that it is better aligned with our broader atmospheric science and research priorities, and we have centralised our aquaculture research at our Bream Bay Aquaculture Park in Northland. These have not been easy, nor always popular, decisions, but we are confident our science capabilities and capacity are now better placed to meet New Zealand's key environmental research and applied science needs.

We have also continued to make important investments in new technology and equipment to support our science staff. Key investments this year have included $1 million to add extra processing power to our high-performance

computing facility, and upgrading our isotope ratio mass spectrometer, which supports research projects across NIWA, such as tracking the origins of sediments and pollutants in coastal environments or determining the effects of aquaculture on marine organisms.

Our 21st year has been a positive one. We met all financial targets and retired all debt. Our final results show revenue of $120.8 million (2011/12: $121.4 million), with earnings before interest, tax, and depreciation (EBITDA) of $18.7 million ($18.9 million) and profit after tax of $4.6 million ($5.5 million). On the strength of our financial performance, we are able to return a dividend to the Government this year of $2 million.

New Zealand's future challenges answered by science

The 10 National Science Challenges announced in May set a clear course for New Zealand science and innovation research and funding in the coming years – the goal being to build a more productive and competitive economy. As Minister Joyce noted in his announcement of the Challenges, "we have a small and reasonably fragmented science system". The 10 Challenges touch on almost all areas of NIWA's work and we are very pleased to have been involved in the initial workshops to help turn those Challenges into collaborative research programmes. Aligning and focusing New Zealand's research through the Challenges will help the Government get better value from its $1.3 billion investment in science and innovation, and we look forward to working collaboratively to achieve this.

The Challenges emphasise the issues at the forefront of New Zealanders' minds – protecting and managing our unique biodiversity, enhancing agriculture while conserving land and water quality, sustainably realising our vast marine resources, exploring Antarctica's role in New Zealand's climate and environment and strengthening New Zealanders' resilience to natural disasters, for example. These are issues – and opportunities – that NIWA has at its core, as New Zealand's leading provider of environmental research and applied science services. By working closely with our stakeholders – sector groups, central government, iwi, and individuals – our science is helping drive our economy forward. Our goal remains to enhance the benefits of our nation's vast natural resources, in a sustainable manner.

Building resilience to nature's challenges

New Zealanders do not need reminding that we remain at the peril of Mother Nature. The December Hobsonville tornado claimed three lives and the Wellington storm in June was one of the worst on record. Preliminary findings released by the Insurance Council estimate the cost of the storm at $33 million. How prepared we are for future natural hazard events depends heavily on NIWA's research, in collaboration with our Natural Hazards Platform partners. When the Hobsonville tornado hit, our people, along with colleagues from the University of Auckland, were on the ground within hours, gathering information about damaged buildings and property. This information was then fed into NIWA's RiskScape model to help assess future risks and how New Zealanders can be better prepared for them. Other natural hazards work this year has included surveying the Kaikoura Canyon to provide new insights into the tsunami risk from undersea landslides, and helping our Pacific Island neighbours better prepare for tsunami risk in their part of the world (see page 28).

For many years, the public assumed that we forecast the weather. In a sense they were right, but our work was behind the scenes. However, this year, in response to the increasing demand for accurate forecasting services, we have refined our forecasting capabilities to develop and launch public products tailored to the specific needs of different users. The first was 'NIWA forecast' – a web-based subscription service, launched at National Fieldays in June, to help New Zealand farmers and growers decide when to carry out weather-dependent operations such as fertilising, spraying and harvesting. The service also helps farmers and growers weigh up risk and make preventative decisions like when to move stock and machinery, irrigate, or protect against frost, snow, heavy rain or high winds. A similar NIWA product is being used by the National Rural Fire Authority to ensure forest owners, rural land management agencies and the public have earlier and better warnings about rural fire dangers, especially in summer (see page 27). This year we also launched a new, free, public weather website, NIWA Weather (niwaweather.co.nz), which provides six-day forecasts for New Zealand urban centres using simple data and striking graphics.

The 2012/13 summer may have delivered ideal weather for those enjoying a range of outdoor activities, but it also delivered one of the most severe and widespread droughts in recent decades, highlighting just how vulnerable our economy can be to a changing climate. The financial impacts of the drought are still being quantified and will likely continue for several seasons, but initial figures from the Ministry for Primary Industries (MPI) show a decline in overall primary sector export revenues for the year to June 2013 of $1.3 billion. Throughout the drought, our climate scientists delivered regular situation briefings to the National Adverse Events Committee and regional councils, and MPI's website linked to NIWA's comprehensive online drought reports and maps showing the latest rainfall, river flow and soil moisture situations. NIWA also fielded hundreds of media enquiries about the drought, emphasising the profound impact the severe weather conditions were having on lives and livelihoods in both rural and urban areas (see page 29).

Understanding the Deep South and its role in our future climate

During the next 30 years, discernible effects on New Zealand's multi-billion-dollar primary sector are likely to arise from climate change. Increasing temperatures and atmospheric carbon dioxide concentrations, and changing rainfall patterns, will have both positive and negative impacts on primary production. NIWA is helping New Zealanders understand those impacts and helping producers adapt and build resilience into their lives and businesses (see page 31). One of the strongest influences on our future environment and climate is the Southern Ocean and Antarctica. This year, our deepwater research vessel *Tangaroa* completed its 10th trip to the ice, in a collaborative 42-day voyage with French and Australian scientists, to study the impact on the environment caused by the 2010 calving of the Mertz Glacier tongue, and to retrieve data being collected by instruments moored to the seafloor in the Mertz Polynya (see page 41).

Making more of our vast marine resources in a sustainable way

Investigating how New Zealand can make the most of its vast marine resources, in a sustainable way, is a core part of NIWA's work. This year, *Tangaroa* undertook an extensive seabed survey off the Otago coast, a potentially rich region for oil and gas exploration, as part of the Ocean Survey 20/20 project led by Land Information New Zealand. Investment in surveys like this helps encourage uptake of exploration permits by the petroleum industry, but also provides data to support future environmental impact and engineering risk evaluations (see page 21). In collaboration with the fisheries sector and MPI, NIWA also carried out research to assess the stock status of 12 commercially valuable species this year – including hoki, ling, hake, southern blue whiting, snapper, paua, oysters and toothfish – as well as continuing to monitor more than 40 other species (see page 19).

Ensuring water quality and quantity for future generations

The multi-billion-dollar primary sector is the cornerstone of New Zealand's economy – and its continued development is essential to our future prosperity. But impacts on the quality and quantity of our freshwater will determine whether such development is viable. In March, Environment Minister Amy Adams announced the first stage of an action plan to improve water quality and the way freshwater is managed. NIWA scientists are working on a range of projects to inform water quality and allocation issues – such as helping to restore the health of our lakes and coastal lagoons (see page 35), eradicating aquatic pest plants from our waterways (see page 37) and developing new tools for farmers to make smarter irrigation decisions. Our freshwater work also includes projects to manage New Zealand's unique biodiversity (see page 36) and protect the environment from biosecurity risks.

Transferring our knowledge to New Zealanders

The public's interest and involvement in setting the National Science Challenges reminded us all that, in order for science investment to provide maximum benefit to New Zealand, our research must be delivered in a way that encourages its uptake and application. NIWA continues to emphasise knowledge transfer as one of our key objectives – through public presentations to community and business groups, sponsorship of major science conferences, social media, and our website and mainstream media activities. This year alone, our work generated more than 6000 media stories and nearly 700,000 unique visitors to our website.

As part of NIWA's outreach to young potential scientists and leaders, NIWA is collaborating with the Sir Peter Blake Trust to provide young people with the opportunity to join a NIWA voyage on *Tangaroa* each year, and we are also sponsors of nine school science and technology fairs. Visits by Science and Innovation Minister Steven Joyce and Energy and Resources Minister Simon Bridges, as well as members of the Education and Select Committee, also gave us the opportunity to demonstrate first-hand how the Government's significant investment in our work is being applied. For more on our outreach initiatives see page 53.

Ensuring excellence in all areas of our business

NIWA has a long-held reputation for high-quality science. That reputation is founded on the profound expertise of our people. We are committed to ensuring excellence in all areas of our work. With that in mind, last year we celebrated our inaugural NIWA Excellence Awards, recognising the achievements of staff who have made an exceptional contribution to NIWA. As it was last year, it was incredibly difficult to select just 12 staff to receive these awards in 2012/13, but we are delighted to present those winners to you in this Annual Report (see page 56). We acknowledge, in particular, the significant achievements of Dr Michelle Kelly, who was awarded a Doctor of Science degree by the University of Auckland for her outstanding contribution to the taxonomy and systematics of sponges, and Principal Technician Tony Bromley, who celebrated 50 years of work with NIWA and our predecessor organisations in June. Tony's contribution to meteorological and air quality investigations has been hugely valuable, as has his work in atmospheric sampling and analysis.

National Invertebrate Collection Manager Dr Kareen Schnabel introduces members of the Education and Science Select Committee to some of the collection's more bizarre specimens. The collection is a heritage asset held by NIWA.

Dave Allen

As part of our ongoing recognition of the importance of health and safety in the workplace, and our focus on continuous improvement, we have reviewed our policies and processes to ensure the health and safety of staff remains paramount. This is especially important given the often challenging environments we work in. Initiatives this year include the appointment of a new National Health and Safety Manager and a new Health and Safety Advisor for our vessels team. Health and safety is also one of the six refreshed NIWA values launched at our Leaders' Forum in September (see page 54).

My role as Chief Executive, and that of the wider Executive Team, is to ensure that we respond to the changing demands of our customers and stakeholders, work with the Board to develop a compelling strategy and act appropriately in the economic environment we face, in order to ensure NIWA's ongoing success.

With the changes and investments we have made in recent years, and with improved agility, we have set ourselves up well for the years ahead. We have continued to build on our internationally recognised science capability, improved our customer service levels and interaction, and are starting to see a small revival in growth of demand for our services.

Our financial performance for the year to 30 June 2013 has been robust, and it is pleasing to be able to resume paying a dividend to the Government as a result.

I am very proud of the NIWA team and thank them for the commitment they have shown to the company this year. Through hard work and prudent management, we continue to build on our successes and achieve strong financial outcomes. I also want to thank the NIWA Board and the rest of the Executive Team for their ongoing support and leadership.

Our purpose is to drive New Zealand's economic and environmental prosperity forward as the country's leading natural resources and environmental science services provider. I am confident NIWA will continue to fulfil that role in the year ahead. It's not just the winds and the currents driving us forward, the vessel is in good shape too. I invite you to take a look at some of our highlights from 2012–13 over the following pages.

John Morgan
Chief Executive

Michael Cunningham

Juvenile kingfish at NIWA's Bream Bay Aquaculture Park. The New Zealand aquaculture industry aims to become a $1 billion industry by 2025.

A performance ahead of expectation

Highlights

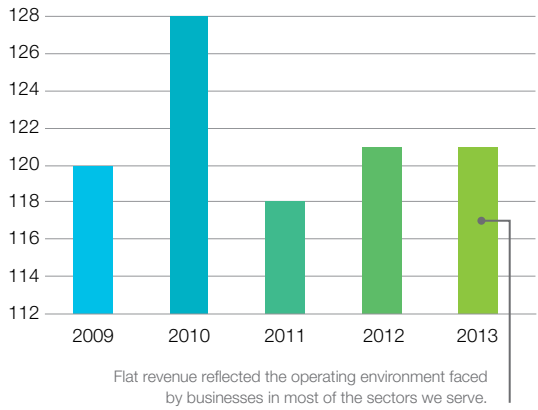
The 2012/13 results reflect a solid performance and the benefits of the realignment of our capability and capacity realised over the last three years. We have maintained our investment in research and applied science services, and met all of our financial targets whilst continuing to improve operational efficiency and manage finances prudently.

We have maintained our scrutiny on resourcing to ensure our facilities and expertise align closely with the current and future needs of our national, regional and global clients and collaborators. This resulted in the reorganisation of our atmospheric monitoring facility at Lauder in Central Otago and the centralisation of our aquaculture research at our Bream Bay Aquaculture Park in Northland.

These changes, and a realisation of efficiencies and cost-control strategies implemented over recent years, enabled us to achieve EBITDA of $18.7 million (2011/12: $18.9 million) and a net profit after tax of $4.6 million (2011/12: $5.5 million), despite flat revenue of $120.8 million (2011/12: $121.4 million). Net profit after tax was $0.6 million ahead of that budgeted in our Statement of Corporate Intent (SCI). The strength of this performance has enabled us to retire all debt, and the Board of Directors to declare a dividend of $2 million to our shareholder, the Government.

We have continued to invest in capital assets that will position us well to act swiftly on new opportunities. We invested $1 million in increasing the computational capacity of our high-performance computing facility (HPCF), an asset central to the expansion of our high-resolution environmental forecasting services. This year we successfully launched custom-designed forecasting products for the National Rural Fire Authority, farmers and growers, and the general public. We also invested further in mass spectrometry equipment for our Wellington laboratory, which lifted our stable isotope analysis capability to world standard.

Total revenue
in millions of New Zealand dollars (includes interest income)



Revenue

The 2012/13 revenue budget was achieved with revenue of $120.7 million.

The value of NIWA's commercial consultancy to New Zealand remained relatively flat at $30.9 million (2011/12: $31.0 million).

International consultancy decreased slightly to $7.3 million (2011/12: $7.8 million).

Expenditure

Personnel costs

The expertise and commitment of our people are key to NIWA's success, and that recognition is reflected in our continuing strategy to remunerate our staff at or above market rates.

Although we had fewer staff in 2012/13 than in 2011/12, an increase in productivity enabled us to achieve revenue close to that of the previous year. The overall cost decreased to $59.3 million (from $60.7 million in 2011/12).

The realignment of capabilities with demand for our research and applied science services resulted in restructuring costs of $1.0 million during the year.

Our ongoing focus on automation and streamlining to value-adding, self-service systems and processes also enabled us to increase efficiencies and improve customer engagement.

Earnings before Interest, Depreciation, and Amortisation (EBITDA)

EBITDA remained steady at $18.7 million (2011/12: $18.9 million).

Net profit after tax (NPAT)

NPAT was $4.6 million (2011/12: $5.5 million), against a budget of $4.1 million. This result reflects the improvements in operating efficiencies. The previous year's result benefited from a one-off credit adjustment to depreciation expense of $3.3 million, as a result of revisions to the expected useful life of RV *Tangaroa*.

Adjusted return on equity (giving a comparative basis with other CRIs) was 6.2 per cent, which was ahead of the SCI budget of 5.5 per cent.

Financial position and cash

Capital

NIWA's capital expenditure was $11.4 million during 2012/13. Major expenses were the expansion of the HPCF, infrastructure, and the installation and commissioning of the third phase of the mass spectrometer upgrade.

Throughout our substantial five-year capital expenditure programme, NIWA's strong operating cashflows ensured that maximum debt did not exceed $19 million. During the current year, net debt has been managed down from $4.7 million to nil and our undrawn short-term loan facility was reduced to $10 million. Retiring all debt, after a comprehensive revitalisation of our asset base, places us in a position of strength as the overall operating environment for our business remains somewhat unpredictable.

Total asset base

Average shareholders' equity at 30 June 2013 was $98.1 million (2011/12: $93.0 million). The streamlining of some parts of our business is reflected in a slight decrease in average total assets, which are now valued at $135.1 million (2011/12: $137.2 million).

Liquidity

NIWA continues to maintain healthy liquidity, and can meet all obligations as they fall due. As at 30 June 2013, the net debt balance stood at nil.

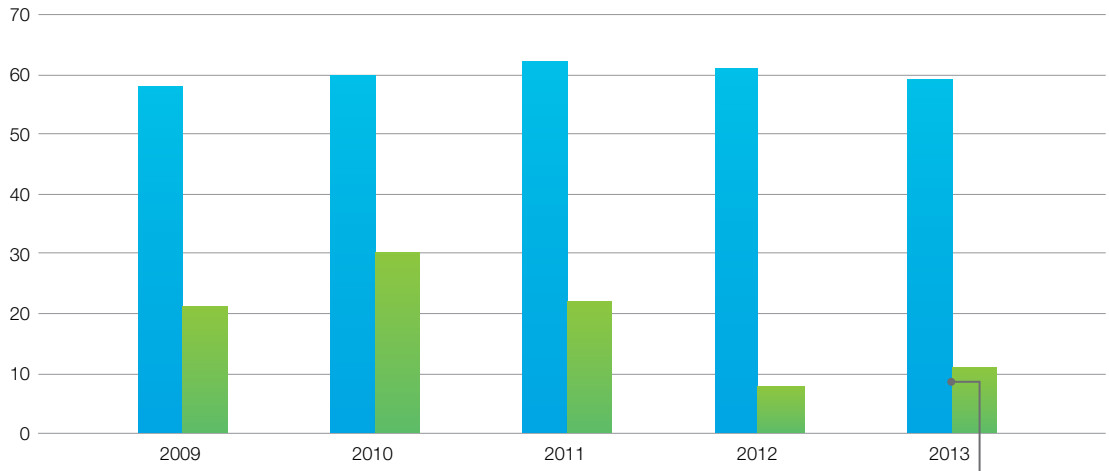
Financial summary

in thousands of New Zealand dollars	2013	2012	2011	2010	2009
Total revenue (includes interest income)	120,784	121,386	117,861	127,917	120,438
– Research	62,739	62,358	64,624	65,646	58,883
– Applied science	57,820	57,384	53,148	62,076	60,872
– Other income	225	1,644	89	195	683
Net profit before tax	6,581	7,450	1,860	9,550	9,050
Net profit after tax	4,640	5,541	1,266	4,497	6,011
Capital expenditure	11,360	8,393	21,990	29,985	21,187
Adjusted return on average equity (%)	6.2	7.9	1.9	7.0	9.8
Return on average equity (%)	4.7	5.8	1.4	5.2	7.1

The 'adjusted return on average equity' uses a valuation basis comparable to other Crown Research Institutes. This valuation basis arose from the transition to New Zealand international financial reporting standards.

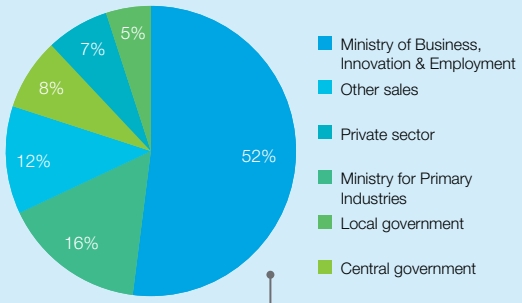
Payroll and benefits, and capital expenditure

in millions of New Zealand dollars



Despite a decrease in headcount and cost of payroll and benefits, increased productivity enabled us to achieve revenues that were close to those achieved in the previous year. Our programme of capital expenditure has continued, positioning us to act quickly as new opportunities arise.

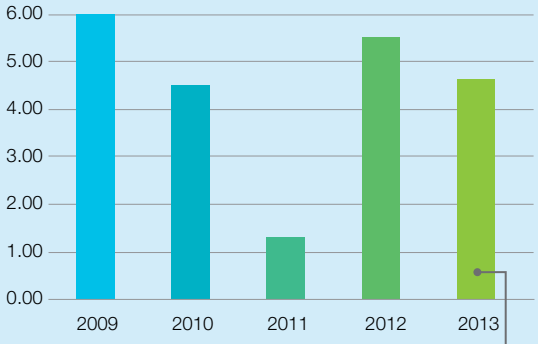
Revenue by source



Whilst revenue by source has remained relatively stable we have worked to expand our commercial customer base.

Net profit after tax

in millions of New Zealand dollars



Achieving NPAT that was ahead of expectation is testimony to the effectiveness of our operational and financial management strategies. It has enabled the NIWA Board of Directors to declare a dividend of $2 million to our shareholder, the Government.

Systems Engineer Fabrice Cantos at work on NIWA's IBM p575 POWER6 supercomputer, 'Fitzroy'. The supercomputer is one of the most powerful of its kind in the Southern Hemisphere, supporting a wide range of research as well as NIWA's high-resolution environmental forecasting capability.

Dave Allen

Delivering leading natural resources and environmental science services

NIWA is New Zealand's leading natural resources and environmental science services provider. Our purpose, set out in our Statement of Core Purpose, is to:

- enhance the economic value and sustainable management of New Zealand's aquatic resources and environments
- provide understanding of climate and the atmosphere, and
- increase resilience to weather and climate hazards to improve the safety and wellbeing of New Zealanders.

We are expected to fulfil our purpose through the provision of research and transfer of technology and knowledge in partnership with key stakeholders, including industry, government and Māori, to achieve six key outcomes:

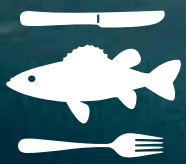
1. Increase economic growth through the sustainable management and use of aquatic resources.
2. Grow renewable energy production through developing a greater understanding of renewable aquatic and atmospheric energy resources.
3. Increase the resilience of New Zealand and southwest Pacific islands to tsunami and weather and climate hazards, including drought, floods and sea-level change.
4. Enable New Zealand to adapt to the impacts and exploit the opportunities of climate variability and change and mitigate changes in atmospheric composition from greenhouse gases and air pollutants.
5. Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity.
6. Increase understanding of the Antarctic and Southern Ocean climate, cryosphere, oceans and ecosystems and their longer-term impact on New Zealand.

The information in this section of the Annual Report demonstrates how NIWA is delivering on its expected outcomes.

NIWA's science and applied research services, however, are delivered through 10 national science centres (see pages 14–17), which are aligned to industry sectors and/or resources, and through NIWA Vessels.

Each centre conducts a wide range of research aimed at enhancing the economic value and sustainable management of New Zealand's aquatic resources and environments, or improving our understanding of climate and the atmosphere and increasing our resilience to related hazards. Much of our work is directly applicable to a wide range of commercial operations.

NATIONAL CENTRE CAPABILITY OVERVIEW



National Aquaculture Centre

NIWA has been designated by Government as the lead Crown Research Institute (CRI) in aquaculture. We focus on supporting the industry's growth targets, particularly through the development of new high-value species which can be farmed with a low environmental footprint.

Our work includes:

- development of high-performance aquaculture
- assessing and modelling the environmental effects of marine farm operations
- providing advice on designing and managing marine farms, and providing associated training
- conducting research into fish health
- providing breeding services
- conducting feed trials.

niwa.co.nz/our-science/aquaculture

National Atmosphere Centre

Understanding the complex relationship between atmospheric composition and climate has never been more important, as extreme weather events linked to climate change make their presence felt. NIWA has been designated by Government as the lead CRI in research and services relating to the understanding of our climate and atmosphere.

Our work includes:

- quantifying the exchanges of greenhouse gases between atmosphere, ocean and biosphere
- quantifying the relationship between atmospheric composition and climate
- measuring agricultural greenhouse gas emissions.

niwa.co.nz/our-science/atmosphere

National Climate Centre

Understanding how our climate behaves, and is changing, is of profound importance to all New Zealanders. NIWA has been designated by Government as the lead CRI in research and services relating to the understanding of our climate and atmosphere.

Our work includes:

- observing, analysing and documenting the climate of New Zealand, the southwest Pacific, the Southern Ocean and Antarctica
- understanding climate processes and causes
- modelling future climate – from seasons to centuries ahead
- developing options for adapting to climate variability and change.

niwa.co.nz/our-science/climate

Dave Allen

National Centre for Coasts and Oceans

NIWA has been designated by Government as the lead CRI in aquatic resources and environments (including coastal environments), aquatic biodiversity and biosecurity, and in oceans to provide the knowledge needed to support the sound management of our marine environments and resources. This ensures the vast economic, social and environmental benefits of our extensive marine estate can be realised.

Our work includes:

- conducting research into physical oceanography, ocean geology, marine ecology, primary production and microbial processes
- undertaking environmental impact assessments
- determining rates of coastal erosion, and climate change impacts on the coast
- investigating impacts of coastal outfall and discharges
- habitat mapping and swath bathymetry of coastal environments.

niwa.co.nz/our-science/coasts-and-oceans

National Centre for Environmental Information

Data that are precise, reliable, and consistently comparable are fundamental to every branch of NIWA's science, and vital to many other end users. Our National Centre for Environmental Information is recognised as leading environmental monitoring and observation, information management, and delivery of high-quality, interoperable environmental data that can be used for many purposes.

Our work includes:

- monitoring the environment through our national observation services and networks
- managing the information we acquire
- delivering information in user-focused ways
- acquiring, storing and disseminating metadata – information about how, where, when and by whom environmental information has been collected.

niwa.co.nz/our-science/ei

National Fisheries Centre

Robust science is critical to the sustainable use of New Zealand's significant marine and freshwater fisheries. NIWA has been designated by Government as the lead CRI in the delivery of research and services relating to freshwater and marine fisheries.

Our work includes:

- assessing fisheries resources within New Zealand's Exclusive Economic Zone
- monitoring and assessing international fisheries
- determining the environmental impact of fisheries

niwa.co.nz/our-science/fisheries

National Centre for Freshwater and Estuaries

Meeting increasing and often competing demands for clean water is one of the biggest challenges facing the planet this century. NIWA has been designated by Government as the lead CRI in aquatic resources and environments (with a focus on surface freshwaters), aquatic biodiversity and biosecurity, freshwater fisheries, and aquatic-based energy resources. We provide public information on river and lake conditions across New Zealand, including water quantity and quality. We also develop and distribute new water-related technology and management tools.

Our work includes:

- monitoring and providing advice on water quality
- catchment modelling
- assessing and managing flow
- advising on the management of freshwater species and habitats
- providing freshwater data online and specialist analytical services.

niwa.co.nz/our-science/freshwater

National Natural Hazards Centre

New Zealanders need little reminding of how destructive Nature can be. NIWA has been designated by Government as the lead CRI in climate and weather hazards. We work closely with a number of other research agencies through the Natural Hazards Research Platform.

Our work includes:

- determining the frequency and magnitude of natural hazards
- estimating risk
- forecasting hazards by using integrated tools and modelling
- assembling research outcomes into meaningful and helpful outputs for end users.

niwa.co.nz/our-science/natural-hazards

National Centre for Māori Environmental Research – Te Kūwaha

NIWA's goal is to share knowledge and empower Māori communities and businesses with leading-edge science. We undertake research and provide consultancy services across a number of core science areas, including aquaculture, freshwater, marine, natural hazards, climate and energy.

Our work includes:

- providing environmental research of benefit to Māori through the formation of strong and meaningful partnerships with iwi, hapū and Māori organisations
- collaborating with Māori, other research providers, and central and local government agencies to identify and respond to Māori research priorities
- developing a distinctive body of knowledge at the interface between indigenous knowledge and research, science and technology
- increasing our Māori research capacity and awareness within NIWA of tikanga and te reo Māori.

niwa.co.nz/our-science/te-kuwaha

Alan Blacklock

The work of these national research centres is complemented and extended by two management centres:

Pacific Rim

NIWA has a long history of providing applied science and environmental consultancy services to support international development activities, with a particular focus on the Pacific and Asia regions.

Our expertise and capabilities cover a wide range of applied science-based assistance to support the sustainable management of marine and freshwater resources and environments, increasing community and economic resilience to natural hazards, and understanding and adapting to the impacts of climate extremes, variability and change.

niwa.co.nz/our-science/pacific-rim

Vessels

NIWA's vessels are world-class environmental monitoring and research platforms. They enable our marine scientists, specialists from partner research organisations and commercial clients to carry out work where the need for knowledge is greatest – no matter how remote or inhospitable the environment may be.

RV *Tangaroa*, our flagship deepwater research vessel, is ice-strengthened and equipped with New Zealand's only DP2 – an advanced dynamic positioning system, which enables it to remain stationary or follow a precise path even in strong winds and rough seas. *Tangaroa* is also equipped with a range of sophisticated equipment enabling us to explore from sea surface to seabed and expand our understanding of our unique marine environment. A wide range of inshore and coastal research is made possible by RV *Kaharoa*, RV *Ikatere* and RV *Pelorus*.

niwa.co.nz/our-science/vessels

The following pages provide an insight into our research and applied science services – which contribute to our six outcomes.

Around 650,000 tonnes of seafood are harvested from New Zealand waters each year.

Peter Marriott

Assessing sustainable levels for our commercial fisheries

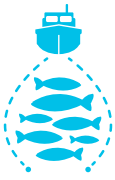
In New Zealand, seafood was the only main export commodity to grow from 2011 to 2012, reaching a record high of $1.57 billion. Around 650,000 tonnes of seafood are harvested from New Zealand waters each year. Balancing the sustainability of our fisheries stocks and the impacts of fishing on the environment with the economic opportunities depends on robust science.

NIWA plays a key role in the sustainable management of New Zealand's commercial fisheries, providing stock assessments and other scientific advice on the impact of harvest levels to the Ministry for Primary Industries (MPI) to help inform management and set quota limits. One hundred and thirty species are commercially fished in New Zealand, 97 of them under the Quota Management System. Last year alone, NIWA carried out research to assess the stock status of 12 commercially valuable species, including hoki, ling, hake, southern blue whiting, snapper, paua, oysters, and toothfish, as well as monitoring in excess of 40 others.

Since 1992, NIWA has run MPI (then Ministry of Agriculture and Fisheries)-funded annual surveys on the Chatham Rise to estimate the abundance of hoki and other commercially important species. The Chatham Rise is particularly important for the fishery because it is the major nursery area for hoki. Survey results show that, although the proportion of hoki in the research catch declined from nearly 60 per cent in 1993 to 21 per cent in 2004, in the last six years hoki have recovered and now make up to 30–40 per cent of the biomass caught. By weighing the fish caught and analysing their otoliths (ear bones), NIWA fisheries staff can also estimate how many fish of each age are caught. Recent surveys show there are good numbers of young (1- and 2-year-old) hoki in the area, which will feed into the population in coming years. As a result of increasing hoki biomass, the Total Allowable Commercial Catch (TACC) was increased by 10,000 to 130,000 tonnes last year.

Hoki is one of several New Zealand species that have been certified sustainable by the international Marine Stewardship Council.

This year, NIWA also completed a combined trawl and acoustic survey of hoki and other middle-depth species off the west coast of the South Island, the first since 2000, which provided abundance indices for 28 species and fed into the 2013 hoki, hake and ling stock assessments.



FIND OUT MORE

To learn more about our fisheries research, visit: niwa.co.nz/fisheries/projects/20-years-of-chatham-rise-fish-surveys

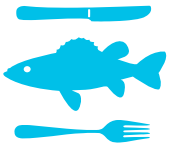
Improved management and planning for the aquaculture industry

Annually, 75,000 tonnes of New Zealand's unique Greenshell™ mussels are harvested, worth more than $200 million to the aquaculture sector. Large Greenshell™ mussel farms operate in Coromandel, Golden Bay and Stewart Island, but 68 per cent of the national harvest comes from Pelorus Sound, in Marlborough.

Predicting the biological yield of mussel farming is extremely important to the industry. Because the mussels are suspended in the water column and feed on plankton, planning stock rates or predicting good or poor growing conditions requires an understanding of the drivers of the planktonic ecosystem that provides mussels with their food. In 1999, farm production in the Pelorus Sound declined sharply by around 25 per cent and took three years to recover. Using physical, chemical and biological data collected over nine years by NIWA and the mussel industry, NIWA scientists were able to show that the decline in mussel production was not due to farming practices, such as over-stocking, but due to climatic, oceanic and hydrological conditions that affected the mussels' planktonic food supply and consequent growth rates.

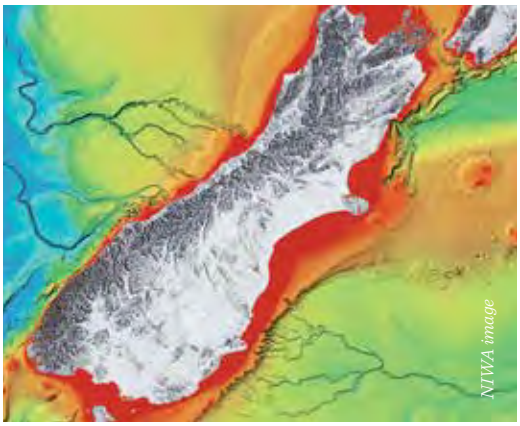
The analysis showed that nutrient supply rates to the Sound are controlled by oceanic inputs (from Cook Strait) and river-flow inputs (from Pelorus River) in ways that are predictable from climatic data. Together, these climatic effects strongly influence the abundance of phytoplankton and organic matter underpinning mussel food supply, which in turn affect mussel yield. The results of this extensive research project have significant commercial implications, enabling mussel farmers to plan better for environmental variability and more accurately project crop growth rates. Together with NIWA's monthly Seasonal Climate Outlooks, they enable the farmers to adjust farm stocking densities to compensate for predicted changes in growing conditions.

The New Zealand aquaculture sector aims to be a $1 billion sector by 2025, and a critical part of achieving this will be to operate sustainably, by balancing increased production with maintaining ecosystem integrity. The work in Pelorus Sound is part of a suite of NIWA models that can predict crop yields and pelagic and benthic effects, and can indicate carrying capacity for a range of cultured species under multiple farming and environmental scenarios. These models have been successfully used in more than 100 assessments of proposed marine farm effects.



FIND OUT MORE

Clean and green or a blight on our coasts? Learn more about NIWA's research on sustainable aquaculture.
Check out our video at niwa.co.nz/publications/wa/water-atmosphere-7-june-2013/down-on-the-farm



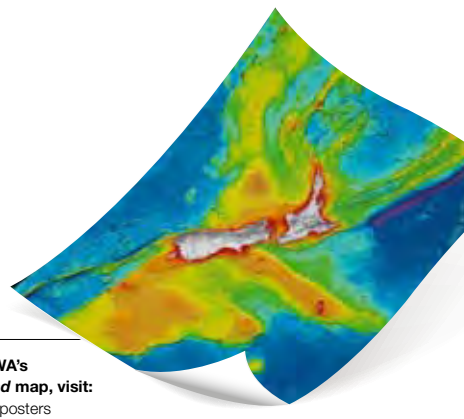
Ensuring the sustainable development of our offshore resources

Last year, a paper released by the Ministry of Business, Innovation and Employment (MBIE) estimated that the annual economic benefits of plausible oil and gas discovery and development could grow exports by $1.5 billion, increase royalty payments by $320 million per annum and create an extra 5500 jobs, increasing GDP on average by $2.1 billion for each year of a 30-year development. The untapped potential of our offshore resources – oil, gas and minerals – is enormous, but this needs to be balanced with the need to minimise risks to New Zealand's unique marine environment associated with their development. NIWA's science makes a very important contribution to the sustainable development of our vast offshore resources – both by identifying potential resources and investigating ways to minimise environmental impacts if they were extracted.

In July, NIWA's deepwater research vessel *Tangaroa* conducted an extensive seabed survey off the coast of Canterbury and in the Great South Basin, potentially rich regions for oil and gas exploration. The voyage was part of the Ocean Survey 20/20 project, a 15-year programme established in 2004 and led by Land Information New Zealand (LINZ), to provide New Zealand with better knowledge about its ocean territory. Investment in surveys like this helps encourage uptake of exploration permits by the petroleum industry, but also provide data to support future environmental impact and engineering risk evaluations.

Using *Tangaroa*'s multibeam echosounder and sub-bottom profiler, NIWA was able to create a highly-accurate digital elevation model of the seabed, showing the shape of the seafloor and an indication of materials it is composed of: silts and clays, sands and gravels, rocks and reefs. More than 20,000 square kilometres of seabed were surveyed during the 18-day voyage. The next stage of the study includes collecting seafloor imagery and samples for a biodiversity assessment. That assessment can be used to establish an environmental baseline, evaluate the potential environmental effects of any oil drilling and help develop any special environmental guidelines specific to the area.

NIWA has also released an updated version of the *Undersea New Zealand* map, first published in 1997. The map is a culmination of NIWA's geological, oceanographic and fisheries research, and is created from NIWA's database of high-resolution seafloor bathymetry from around New Zealand. It also incorporates significant national and worldwide data sets. *Undersea New Zealand* provides significant benefits to New Zealand, assisting fisheries and environmental management, conservation, hazard mitigation, and energy and mineral exploration.



To order a copy of NIWA's *Undersea New Zealand* map, visit:
niwa.co.nz/publications/posters

High-elevation snowpack feeds most of New Zealand's key hydro lakes, including those on the Waitaki River.

Rob Suisted

Measuring the potential power in alpine snow and ice

New Zealand's electricity industry needs reliable information on river flows and lake levels to determine how much water is available for hydro generation at different times of the year, and to coordinate alternative supply sources as necessary. Almost half of the country's supply – worth $6 billion annually – is hydro generated, so the stakes for the country are high.

The amount and density of snow and ice at high elevations are important influences on river flows and lake levels lower down – particularly during early summer when snowmelt is greatest and rainfall often diminishes. In 2012, NIWA completed the first phase of its snow and ice monitoring network, which is helping to quantify high-elevation snow and ice and improve understanding of its influence on low-level water availability, seasonally and longer term. Findings are of direct relevance to the electricity industry and to irrigation – because large alpine rivers provide water supply.

The snow and ice network comprises 11 specially equipped climate stations, installed at strategic locations along the Southern Alps and at the Chateau, Mt Ruapehu. Each station measures snow depth and associated climate information. Four of them (Mueller Hut, Philistine, Murchison and Mahanga) measure snow temperature and density, enabling NIWA scientists to estimate how much water would result if the snow melted (known as Snow Water Equivalent).

In addition, Mueller Hut measures solid and liquid precipitation (snowfall and rainfall). These measurements will be used to determine how much precipitation is falling at high elevation.

Sensors transmit ultrasonic pulses towards the snow surface and measure the time it takes the echoes to return – an indication of distance. As snow accumulates, the distance between the sensor and the snow surface decreases, enabling scientists to work out the depth of the snow that has fallen. Instruments called 'snow pillows' record the weight of the snow. By measuring both depth and weight, scientists can calculate density, which indicates how much water is stored in the snowpack.

Each station takes measurements every five minutes. Data are collected and transmitted over a satellite radio link to a server, from where near-real-time data are accessible via the Internet.

Freshwater users like the electricity and irrigation industries are concerned about the effect climate change will have on water availability. NIWA's snow and ice network, along with its advanced numerical modelling capabilities, will enable researchers to predict how water availability may change in the short term (up to 15 days), seasonally and over longer time scales under a range of future climate scenarios – helping users plan and prepare.

FIND OUT MORE

To learn more about our energy sector work, visit:
niwa.co.nz/our-services/energy

Improved management of hydro-energy facilities

More than half of New Zealand's electricity is generated from our hydro lakes, which means power companies need to invest heavily in ensuring the waterways that supply hydro stations are well maintained.

Meridian Energy runs the Waitaki hydro system in the South Island, a network of six hydro stations from Lake Pukaki to Waitaki, including Benmore, which is the country's second-largest after Manapouri. Together, these stations generate enough electricity each year for about 832,000 New Zealand homes.

NIWA scientists are working with Meridian and Land Information New Zealand to control the spread of the aquatic weed lagarosiphon in the Waitaki hydro lakes. Large rafts of aquatic weeds have been known to affect intakes to hydro-power stations in other parts of New Zealand.

Lagarosiphon, also known as oxygen weed, grows rapidly and can block hydro station water intakes if not kept in check, costing power companies hundreds of thousands of dollars in lost generation time. The weed also affects water quality, reduces diversity and limits food sources for fish. An infestation of lagarosiphon in the Ahuriri side arm of Lake Benmore was first discovered in 2003. It has been effectively contained over the last 10 years, but a new outbreak was recently discovered in the main arm of Lake Benmore.

NIWA's role is to advise on surveillance and eradication strategies and contribute to the implementation of management plans for lagarosiphon in the Waitaki hydro system. Aerial spraying is carried out on large dense beds, with dredging or hand-picking reserved to control medium-sized and smaller infestations. Scientists work with the spray contractors and analyse results by comparing them with control sites. This then enables the scientists to make recommendations on prioritising the next site.

Surveillance is an important part of the control programme, and scientists regularly check unaffected areas for new signs of lagarosiphon. They also prioritise sites based on the proximity to road access, where boats are most likely to be launched and where large events, such as rowing regattas, are held. Forecasts are made on which areas are most at risk for possible spread by analysing distribution pathways and water-flow rates.

Lagarosiphon was introduced to the South Island hydro lakes via an ornamental pond with an outflow to the Ahuriri River. Today, spraying is the only realistic way to manage large outbreaks.

So far the programme has successfully held back the rate of spread. Continued vigilance using expert scientific analysis is needed to ensure good lake management and minimise the risk of intake blockages.

FIND OUT MORE

To learn more about our work with Meridian Energy, visit:
niwa.co.nz/freshwater-and-estuaries/projects/waitaki-weed-surveillance-plan

Helping New Zealanders turn on the sun

Solar energy is abundant, renewable and non-polluting, yet it is vastly underutilised in New Zealand. The Energy Efficiency and Conservation Authority (EECA) says less than two per cent of our households use solar energy to heat water or generate electricity, despite many New Zealand homes receiving 20 or 30 times more energy from the sun each year than they use in electricity or gas. Even our southernmost towns and cities receive approximately the same level of solar energy as in Germany – where solar panels are commonly used.

EECA estimates that if every New Zealand home installed a three-kilowatt solar panel array, they would collectively generate enough power in a year to satisfy over a quarter of New Zealand's annual residential electricity needs.

NIWA recognises that greater uptake of solar generation relies on consumers clearly understanding how much energy is available where they live, at different times of the day and year. So in 2012, NIWA launched SolarView – a free online tool (solarview.niwa.co.nz) that estimates the average amount of solar energy available to power a one-square-metre solar panel at any location in New Zealand, from sunrise to sunset, on any day of the year. A one-square-metre solar power panel will produce around 200 watts of electricity per hour of direct sunlight. Average electricity consumption for New Zealand homes accounts for around 7700 kilowatt hours (kWh) per year, per house.

Users enter their street address, or click a location on the embedded Google Maps link, and then specify the tilt and direction of their roof or panel-bearing surface. SolarView factors in surrounding terrain, and accurately depicts the sun's path at five representative dates during the year. It then taps into NIWA's climate database to plot hourly measurements of cumulative solar radiation in kWh per square metre, on each path.

SolarView offers guidance on how to plot nearby obstructions, like buildings and trees, onto the profile and calculate the effect of their shade on the amount of radiation received.

Solar energy specialists and homeowners use SolarView extensively to help determine how much money solar panels or a solar water heating system may save them. Between 1 July 2012 and 30 June 2013, SolarView received more than 7000 visits.

FIND OUT MORE

To learn more about SolarView, visit: niwa.co.nz/publications/wa/water-atmosphere-6-november-2012/solutions-outlook-for-sunshine

In dry years, out-of-control blazes have cost up to half a million dollars to quell. Staying one step ahead of fire risk is key.

Scott Hammond, The Marlborough Express

Fighting fire with fine-scale forecasting

During hot, dry summers like 2012/13, the National Rural Fire Authority (NRFA) faces a constant challenge managing fire risk. Rural fire managers must marshal firefighting resources and consider restrictions and bans – at a time when public enjoyment of rural areas is at its highest.

When things go wrong, the cost is high. The fires that destroyed homes and businesses in mid-Canterbury last January were a stark reminder of what's at stake. In previous dry years, such as 2009, out-of-control blazes have cost as much as half a million dollars to quell.

NIWA, working with NRFA and research partner Scion, has developed an online tool that gives rural fire managers early warning of weather and forest conditions that are likely to raise the fire risk. Powered by high-resolution forecasting technology called EcoConnect, the tool delivers local six-day fire-weather index forecasts direct to managers every day. These are backed by local weather forecasts out to 15 days, and a range of longer-term climate analyses of the fire season ahead. The tool also displays real-time weather data where available, providing an instant snapshot of current conditions in the area. Users can set automatic alerts, which trigger an SMS or email message to be sent whenever conditions pass, or are forecast to pass, pre-set thresholds.

Fire managers use the information to guide operational decisions, including where and when to locate standby firefighting teams and apply restrictions or bans.

EcoConnect draws on the computational power of NIWA's IBM supercomputer, housed in Wellington. The supercomputer runs sophisticated numerical models that mimic complex natural processes to generate discrete weather forecasts for locations as close as a few kilometres apart.

NIWA is using this capability to develop new forecasting products for a range of other commercial and recreational users. At National Fieldays in June, it launched 'NIWA forecast' for farmers and growers – an online subscription weather forecasting service tailored to the needs of the primary sector. Subscribers receive real-time data and forecasts out to 15 days for the weather station that best reflects conditions on their property, along with a range of local and regional climate analyses. They use the information to aid key operational decisions such as when to fertilise, spray, harvest, irrigate and protect against frost.

The same technology underpins 'NIWA Weather' (niwaweather.co.nz), a free online forecasting service for urban New Zealanders, also launched in June. NIWA Weather provides a simple, graphical snapshot of forecast weather for towns and cities during the next six days – helping people find their window of opportunity to undertake weather-dependent activities.

ONLINE RESOURCE

Find out more about how NIWA forecast is helping farmers and growers manage weather-dependent operations.
Check out our video at niwa.co.nz/online-services/niwa-forecast

Assessing and communicating tsunami risk in Wallis and Futuna

Recent catastrophic tsunamis generated by earthquakes near Sumatra (2004), Tonga-Samoa (2009) and Japan (2011) drew worldwide attention to the risks faced by coastal areas of Pacific Island Countries and Territories (PICT) such as the French territory of Wallis and Futuna.

In response, NIWA partnered with the Institut de Recherche pour le Développement (IRD) in New Caledonia and the University of New South Wales (UNSW) in Sydney to undertake research aimed at improving understanding of how tsunamis are generated, travel across the ocean, flood land and affect coastal communities and infrastructure.

The comprehensive study commenced in Wallis and Futuna soon after the 2009 tsunami, and concluded in 2012. There were four phases:

1. Collecting physical evidence of wave heights and flooding on the islands of Futuna and Alofi, caused by the 2009 tsunami.
2. Collecting geological evidence of pre-historical tsunamis and oral tradition recollections of tsunamis prior to European arrival.
3. Identifying and characterising earthquake sources around the Pacific capable of generating tsunamis that could affect Wallis and Futuna.
4. Developing computer-generated scenarios of flooding on Wallis and Futuna caused by tsunamis from different sources, to characterise the impact and to estimate tsunami travel times from their origin to each island.

The study identified one local, five regional and five Pacific-wide sources of tsunamis with the potential to affect Wallis and Futuna, from which 14 scenarios were generated. NIWA incorporated these findings into a report that includes maps indicating maximum expected wave heights and run-ups, and areas of flood hazard, for each island and each tsunami source. Tables show estimated arrival times, in different parts of the territory, of tsunamis from each source.

NIWA also produced English and French versions of a Q&A sheet that summarises key study findings using language and terminology meaningful to members of the general public.

The report and supporting information were communicated to Wallis and Futuna territorial administrations and communities to help them develop evacuation and emergency response plans, and factor risk into future infrastructure developments and land-use planning.

The study was funded by the EU EDF 9-C Envelope Project to Support Disaster Risk Reduction in Pacific EU Overseas Countries and Territories (through funding provided to SPC-SOPAC), the Pacific Fund of the French Ministry of Foreign and European Affairs, with additional funding from IRD, UNSW and NIWA research projects.

FIND OUT MORE

To learn more about assessing tsunami hazard in Wallis and Futuna, visit: niwa.co.nz/pacific-rim/projects/tsunami-hazard-in-wallis-and-futunaoutlook-for-sunshine

Informing the drought response

As extremely dry weather took hold of much of the country during the first three months of 2013, regional and central government authorities prepared strategies for mitigating the impacts and providing support to those worst affected. Authorities needed relevant, up-to-date information on the scale and severity of the situation – and the long-term prospects for rain – to support their decision making, particularly relating to adverse-event drought declarations in affected regions.

Throughout February, March and the early part of April, NIWA climate scientists delivered regular situation briefings to the National Adverse Events Committee and regional councils. They also delivered weekly updates to the Ministry for Primary Industries (MPI), while MPI's website linked to NIWA's comprehensive online drought reports and maps indicating the latest rainfall, river-flow and soil-moisture situations.

In addition, NIWA responded to hundreds of enquiries from print, television and radio media – resulting in more than 800 media stories in March alone and helping to keep the public informed as the dry weather had an increasingly significant impact on lives and livelihoods in both rural and urban areas. The financial impacts of the drought are still being quantified and could continue for several seasons. MPI has analysed the impact of the drought on primary sector export revenues and this shows a decline for the year to June 2013 of $1.3 billion.

NIWA's Seasonal Climate Outlooks, issued early each month and posted on the NIWA website, became hot property during the prolonged dry spell. The outlook issued in January received 1742 visits, in February 1892 visits, in March 2914 visits and in April 1972 visits. NIWA also published a question-and-answer report after the event. It was distributed through a range of channels – including National Fieldays at Mystery Creek – to help affected communities understand the event in a historical context, and prepare for the possibility of more frequent severe dry spells as our climate changes.

IN BRIEF

To learn more, visit: niwa.co.nz/publications/wa/water-atmosphere-7-june-2013/in-brief-dry-run

Modelling by NIWA indicates droughts are likely to become more frequent and more severe in eastern and northern parts of New Zealand, as our climate changes.

Dave Allen

Helping primary industries adapt to climate change impacts

During the next 30 years, discernible effects on New Zealand's multi-billion-dollar primary sector are likely to arise from climate change. As temperatures warm, atmospheric carbon dioxide concentrations increase and rainfall patterns change, there will be positive and negative impacts on primary production. Understanding those impacts, and helping producers adapt and build resilience, are vital priorities for the country.

At the instigation of the Ministry for Primary Industries (MPI), NIWA collaborated with AgResearch, Plant & Food Research, Landcare Research, Scion and DairyNZ to undertake a comprehensive three-year study into the impacts of climate change on land-based primary industries, and the options for adaptation. The study integrated a literature review with sophisticated computer modelling to closely analyse implications for the dairy, sheep and beef, broad-acre cropping, horticulture and forestry industries. The research also included a cross-industry analysis of the likely effects on national and regional water resources.

Collaborators in the study applied results from NIWA's climate forecasting models to their own sector models, to analyse how predicted climate changes would impact on each industry. Together with the literature review, this analysis informed adaptation options, which are described at three levels:

- Tactical adaptation modifies an existing production system using commonplace contemporary management strategies (e.g., altering timing of sowing and harvesting).
- Strategic adaption involves shifting to other production systems or making substantive changes to existing ones (e.g., changing from one grape variety to another).
- Transformation adaptation means develping completely new production systems, or even industries.

Overall, the report indicates that New Zealand's primary sector is well placed to cope with climate changes predicted by 2040. The industries are nimble and adaptation options numerous and achievable – giving cause for considerable optimism among stakeholders.

Key results from the study were published in a stakeholder report, which MPI has circulated widely. The report, *Impacts of Climate Change on Land-based Sectors and Adaptation Options*, draws together essential findings using non-technical language and clear graphics, helping land managers understand their risks and opportunities and allowing them to plan accordingly.

ONLINE RESOURCE

The stakeholder report is available to download from the MPI website. Visit: mpi.govt.nz/Default.aspx?TabId=126&id=1581

Enhancing international efforts to improve ozone depletion

Hailed as the most successful international environmental protection treaty to date, the Montreal Protocol celebrated its 25th anniversary this year. The Montreal Protocol is the global agreement to phase out the production and use of substances depleting the ozone layer. Because of New Zealand's location, and because of its world-class research scientists and instrumentation, NIWA's contribution to the treaty has been profound. NIWA staff have been providing ozone measurements from Lauder, in Central Otago, and from New Zealand's Arrival Heights research station at Scott Base in Antarctica, since 1988, shortly after the Montreal Protocol was signed. Those measurements play a significant role in monitoring the long-term changes in the ozone layer.

Ozone is a naturally occurring gas in the stratosphere, 15–50 kilometres above the Earth's surface, which protects humans and the biosphere by filtering solar (UVB) radiation. In the lower atmosphere, many ozone depleting substances (such as chlorofluorocarbons (CFCs)) are chemically inactive, but in the stratosphere (above 17 kilometres) they break up under intense UV radiation, causing ozone destruction and the formation of the ozone hole.

Over New Zealand and parts of Australia, there was a significant thinning of the ozone layer during the 1980s and 1990s, causing an increase in UV radiation at the Earth's surface, which is linked to the occurrence of skin cancer. But thanks to international collaboration under the Montreal Protocol, in the past 10 years, Antarctic ozone depletion has stabilised and is showing first signs of recovery. Atmospheric models run by NIWA staff and other international scientists show that, if the Protocol had not been enacted, the ozone layer would have been almost completely eliminated by the end of the 21st century, and UV radiation would have reached levels unheard of today. The resulting impacts would have included significantly increased rates of skin cancer and greatly reduced food production because many plants could not have existed under such conditions.

Staff at NIWA's Lauder site are also measuring stratospheric nitrogen dioxide (NO_2) as part of an international collaboration through the Network for Detection of Atmospheric Composition Change (NDACC). With halogen reducing in the stratosphere, nitrogen compounds (like NO_2) are the future primary stratospheric ozone depleting agents. The Lauder measurements, which have been collected for 32 years, are used to validate and calibrate NASA satellite measurements, and are available in international databases.

FIND OUT MORE

To learn more about NIWA's Lauder Atmospheric Research Station, visit:
niwa.co.nz/our-science/atmosphere/lauder

A crucial and sustained contribution to global greenhouse gas studies

Climate scientists the world over rely on accurate and comparable measurements of greenhouse gases like carbon dioxide (CO_2) to advance their research into climate change and the influence of human activities on atmospheric composition. Atmospheric processes, and the weather and climate they generate, cross national and geographical boundaries, so consistent long-term measurements from around the globe are crucial.

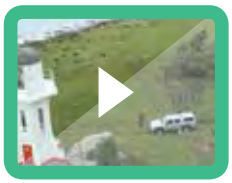
In December 2012, NIWA's Baring Head Clean Air Observation Programme reached a major milestone – achieving 40 years of continuous CO_2 monitoring. This is the second-longest continuous measurement record in the world and the longest in the Southern Hemisphere.

Baring Head station is located on a clifftop near the southern tip of Wellington Harbour. Its measurements are highly valued because the site is exposed to strong southerly winds bringing in clean air that has not been in contact with land for at least five days. Its measurements are representative of large areas of the mid-latitude Southern Hemisphere.

A long and uninterrupted time series of measurements is important so that scientists can determine how the concentration of CO_2 in the atmosphere changes over time, in relation to human activities that emit CO_2 into the atmosphere. A proportion of what is emitted stays in the atmosphere, and by measuring it precisely scientists gain a better understanding of how much energy is trapped in the atmosphere – and hence the expected rate of global warming.

The long-term trend from Baring Head shows that the amount of CO_2 in the atmosphere is continuing to increase each year. The growth rate is currently around 2 parts per million (ppm), or 0.5 per cent, every year. There is 20 per cent more CO_2 in the atmosphere now (390ppm) than when the measurement series started (325ppm).

NIWA also makes significant measurements at its sites in Lauder in Central Otago, Rainbow Mountain near Rotorua and Arrival Heights in Antarctica. NIWA is a significant contributor to an international network of stations called the Global Atmosphere Watch (GAW) Network, coordinated by the World Meteorological Organization.



IN THE FIELD

Dr Katja Riedel explains the process of sampling air at Baring Head, near Wellington. Check out our video at niwa.co.nz/video/atmospheric-research-at-baring-head

Floating wetlands, like these on Lake Rotorua, can remove 40 to 60 milligrams (mg) of phosphorus per square metre every day, and between 500 and 800mg of nitrogen.

Dave Hansford

Helping with the rehabilitation of our lakes and coastal lagoons

Regional councils wanting to mitigate the effects of agricultural run-off into lagoons, lakes and streams are looking at how they can recreate natural environments to help restore heavily polluted waterways.

On the basis of previous research on the efficacy of wetlands treating diffuse run-off from agricultural catchments, NIWA scientists were contracted by Environment Southland and DairyNZ, to investigate constructed wetlands mitigation options to improve the state of the Waituna Lagoon.

The Waituna Lagoon, about 25 kilometres southeast of Invercargill, is one of the projects supported through the Ministry for the Environment's Fresh Start for Fresh Water Clean-up Fund. It is considered to be one of the best remaining examples of a natural coastal lagoon in New Zealand and is highly valued by iwi, anglers, hunters and landowners.

However, increased sediment and nutrient loads associated with agricultural intensification in the Waituna catchment have led to declining water quality in the lagoon. Excessive algal growth and reduced oxygen levels in the bottom waters and sediments are reducing the health of seagrass beds and contributing to a decline in native fish numbers. The hydrology of the catchment has also been significantly altered, through wetland drainage, extensive networks of subsurface tile-drains and straightening and deepening of streams, which are now maintained primarily as drainage channels.

NIWA, in association with Environment Southland, surveyed the catchment to identify appropriate locations for constructed wetlands in the catchment, to advise on their optimum size and design, and recommend suitable plant species. Based on previous NIWA work (see link below) costs for construction, maintenance and lost income from the land were calculated to provide an estimate of costs per hectare of wetland and per kilogram of contaminant removed.

Natural wetlands work by filtering nutrients and trapping sediment before they reach waterways. Constructed wetlands mimic these conditions to treat the water flowing through them. Although these wetlands have significant upfront construction costs, they have relatively low maintenance costs. They can also last a long time if they are properly maintained.

NIWA investigated 30 constructed wetland options at 14 locations in the Waituna catchment, ranging in size from about half a hectare to about 63 hectares and including small on-farm options and larger wetlands on tributaries and stream channels. If the wetlands occupied around 0.5 per cent of the land, they could substantially reduce sediment loads, but 2–5 per cent of the land would need to be converted to wetlands to substantially reduce nutrient loads transported to the lagoon.

NIWA scientists also developed a 'traffic light' ranking system of the sites, based on how much contaminant they could remove, and developed formulas to estimate how much it would cost to build each wetland depending on existing landscape features.

The work completed on the Waituna Lagoon is also being applied in assessing the value of wetlands in other Clean-up Fund projects in Wairarapa and Canterbury.

ONLINE RESOURCE

NIWA's tile drain wetland guidelines have been developed to assist farmers to construct wetlands to treat tile drainage flows from grazed pastures.
Check out our online guidelines at niwa.co.nz/our-science/freshwater/tools/tile-drain-wetland-guidelines

Developing new techniques for monitoring endangered species

Pheromones secreted by a freshwater fish once prevalent in New Zealand streams are being investigated by NIWA scientists to discover more about a rare and little-known species here.

The lamprey (kanakana/piharau) population is in decline, but historically the species has been important to Māori as a food resource, and elaborate weirs were constructed to catch them.

Today, lamprey populations are strongest in the South Island, but little is known about their biology, where they spawn, their migration triggers and preferred habitat. NIWA is seeking to fill these knowledge gaps, as well as evaluating whether pheromones can be used to attract lamprey to areas with depleted populations. Mātauranga Māori is also crucial to this research project, as knowledge from customary fishers is sought to increase scientists' understanding about the historical abundance, distribution and timing of spawning migrations and location of lamprey rearing areas.

Lamprey live for up to seven years and grow up to 750mm long. Adult fish are seldom seen, except where there are barriers to their natural migration. The young larvae spend several years living in the sediment of stream beds before undergoing metamorphosis and heading out to sea. They return as adults to freshwater to spawn, and spend up to 16 months in freshwater during their upstream migration to the spawning grounds, before dying after they spawn.

In the Northern Hemisphere, adult male sea lamprey return to spawn in riverbeds by detecting cues from upstream resident larvae. They then secrete a pheromone that attracts the female lamprey to their nest site. In sea lamprey, spawning takes place within a couple of months of entering freshwater.

Scientists are working to discover the chemical compounds used to attract adult lamprey to the spawning streams, with the aim of discovering spawning sites and using the chemical cues to attract lamprey back to areas where they have declined.

Conventional methods of tagging fish have been unsuccessful with lamprey because of their burrowing habits, but new and smaller passive tags (PIT tags), about 12mm long, that are inserted into the fish using a syringe, are now helping monitor their movements.

NIWA scientists are also collaborating with scientists at Michigan State University in the US, who study the sea lamprey that have proliferated in the Great Lakes and are now regarded as a pest fish. US scientists, who have identified a number of fish pheromones, are interested in the evolution of the pheromone cue in lamprey. Although Northern Hemisphere lamprey belong to a different family than New Zealand lamprey, they may be using the same or similar pheromones to locate spawning sites.

FIND OUT MORE

To learn more about restoration and enhancement of piharau, kanakana and lamprey, visit: niwa.co.nz/te-k%C5%ABwaha/projects/restoration-and-enhancement-of-piharau-kanakana-lamprey

Ridding our waterways of aquatic invaders

Waterways are a vital resource – providing economic, environmental and recreational benefits – but introduced aquatic plants pose serious risks to the health and value of these unique ecosystems. In recent decades, over 70 freshwater invasive aquatic plants have been introduced into New Zealand, with most lakes, rivers, streams and wetlands now affected by at least one species of introduced pest plants. Introduced aquatic weeds not only smother native plants, but also cause serious problems for electricity generation by clogging up hydro dams (see page 24), impede irrigation and flood control schemes, damage indigenous freshwater ecosystems, and make recreational activities, like swimming and boating, more difficult.

Working closely with the Ministry for Primary Industries (MPI), the Department of Conservation (DOC), Land Information New Zealand (LINZ) and regional councils, NIWA is helping to stamp out these silent invaders using a mixture of mechanical, chemical (herbicides) and biological control measures.

This year, NIWA confirmed that one of New Zealand's three worst invasive aquatic weeds, hornwort, had been successfully eradicated from the South Island, using the aquatic herbicide endothall. MPI called on NIWA to carry out the eradication at Timaru's Centennial Park Lake, after assisting in earlier eradication from sites in Motueka. Five years after NIWA first applied endothall to the lake, annual surveillance checks show that the weed has gone, and MPI has been able to declare the South Island free from hornwort. NIWA is continuing to help with eradication programmes at North Island sites where hornwort is at an early stage of establishment, to help protect surrounding high-value waterways.

NIWA is also working with aquarium and pond owners to help them select and culture benign plants instead of invasive species. An estimated 75 per cent of aquatic plants are introduced to New Zealand waterways through the aquarium and ornamental pond trade. Working in collaboration with the Federation of New Zealand Aquatic Societies, NIWA is helping to deliver information on plant identification and weed risk to hobbyists and the wider public. This includes developing two pictorial plant guides to help aquarium hobbyists select non-invasive plants. The project was jointly funded by DOC's Terrestrial and Freshwater Biodiversity Information Systems Programme and the former Foundation for Research, Science and Technology.

A collaboration between NIWA and MPI is also focusing on preventing the spread of aquatic plants, with 33 species nationally banned from sale, propagation and distribution under the National Pest Plant Accord (NPPA).

ONLINE RESOURCE

Learn more about New Zealand freshwater pests with NIWA's online fact sheets. Visit niwa.co.nz/freshwater-and-estuaries/management-tools/identification-guides-and-fact-sheets/freshwater-pest-species

Air bubbles trapped in the layers of ice in Antarctica over tens of thousands of years may provide clues about how powerful greenhouse gases will affect our climate in the future.

Adrian Bass

Using ice coring to understand more about future climate change

Tiny air bubbles trapped in the layers of ice in Antarctica over tens of thousands of years may provide a host of clues about how powerful greenhouse gases will affect our climate in the future.

In January, NIWA scientists, supported by a Marsden Fund grant, travelled to Antarctica's Taylor Glacier to take ice-core samples.

The ice provides a record of changes in the atmosphere over long periods of time and the core samples are indispensable for studying the connection between climate and greenhouse-gas concentrations.

Each year the Antarctic snow does not melt, but forms another layer of ice, which in turn compresses the lower layers from previous years, trapping air.

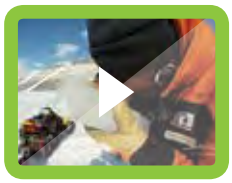
While these air bubbles would normally be buried hundreds of metres deep, the local geography of the Taylor Glacier in the Dry Valleys provides the opportunity for scientists to collect large samples of ancient ice between 10,000 and 100,000 years old from near the glacier surface.

Examining the air bubbles enables scientists to see how sources of carbon responded to warming in the past. This helps them predict how similar sources would react to modern climate changes.

The samples are taken back to the laboratory in Wellington where the air in the bubbles is analysed for different types of greenhouse gases: methane, carbon dioxide and nitrous oxide. The ice cores provide evidence of the close relationship between temperatures and concentrations of greenhouse gases.

Over the last few hundred thousand years, ice ages have ended with periods of rapid warming. At the end of the last ice age the concentration of methane increased rapidly. Understanding what was behind the release of this methane will help scientists understand how methane sources in the world today will respond to global warming.

By considering similar studies on carbon dioxide, scientists will be able to establish what warming (or cooling) resulted from different greenhouse gas concentrations in the past, as a guide to the sensitivity of the climate to future greenhouse-gas changes.



IN THE FIELD

Dr Katja Riedel and Dr Hinrich Schaefer discuss NIWA's ice coring work on Taylor Glacier in Antarctica. Check out our video at niwa.co.nz/video/back-to-the-future


Katja Riedel

Enhancing our understanding of the Earth's climate

When the sea ice in the Southern Ocean freezes over winter it effectively doubles the size of Antarctica.

Although scientists know the sea ice near the coast can grow up to two metres thick in a single year, until now they have faced major hurdles trying to understand the long-term trends in its development. Only since 1979, when continuous satellite records began, have scientists have been able to accurately record and observe the extent of the sea ice.

The extent and volume of sea ice over time is a key indicator of changes to the Earth's climate. As the sea ice forms, it leaves behind salt which sinks and drives the deep ocean circulation. As it sinks it draws down greenhouse gases, making the deep ocean a repository for carbon dioxide from the atmosphere.

NIWA scientists have recently discovered that the variability in sea ice can be observed in atmospheric pressure records over New Zealand and offshore islands, in particular Campbell Island and the Chatham Islands.

What is most useful with this discovery is that the pressure records can be used to reconstruct the extent of sea ice before satellite records began.

Combining modern satellite images and records from these sub-Antarctic island weather stations has enabled scientists to establish that the extent of sea ice was higher in the 1950s and 60s than it was in the 1970s and 80s.

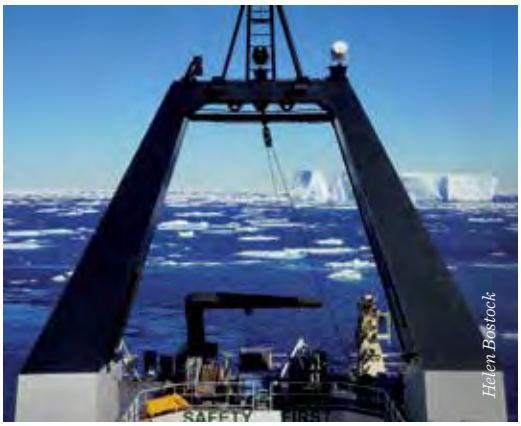
The ability of these long-term records to tell a story about something that could not be observed directly at the time is exciting to scientists monitoring the effects of climate change.

Increased knowledge of sea ice will improve understanding of the downstream effects on deepwater circulation, the carbon cycle and predictions of New Zealand's – and the planet's – climate system.

This work also contributes further understanding to one of the National Science Challenges announced by the Government in May: The Deep South.

IN THE FIELD

Physical Oceanographer Dr Mike Williams talks about Antarctic sea ice: what it is, it's importance, and the difficulty in measuring its extent. Check out our video at niwa.co.nz/video/antarctic-sea-ice



Helen Bostock

Broadening international understanding of Antarctica's unique environment

In February, 22 New Zealand, Australian and French scientists embarked on a 42-day journey aboard NIWA's research vessel *Tangaroa* to the Mertz Polynya, off the coast of Antarctica.

The principal aim of the voyage was to study the impact on the environment caused by the 2010 calving of the Mertz Glacier tongue and to retrieve data being collected by instruments moored to the seafloor in the polynya.

The Mertz Polynya, an open area of water surrounded by ice, is one of three major areas in Antarctica that controls the properties of the deep ocean, and scientists planned to use underwater cameras and sensors to study the changes to this part of the Southern Ocean.

Unfortunately, a build-up of sea ice that would ordinarily have disappeared by late summer prevented *Tangaroa* from gaining access to the polynya, so the scientists instead turned their attention to the Continental Slope.

Using a Conductivity, Temperature, Depth profiler (CTD) scientists took measurements at various points en route to and from Antarctica. These data will be compared with data collected in the same locations several times previously. The amount of carbon dioxide being stored in the deeper waters, an indicator of acidification, was also measured.

Sedimentary cores up to six metres long were taken from the seabed to determine changes to temperature, nutrients, biological productivity and sea-ice extent over thousands of years.

The Southern Ocean plays a critical role in the Earth's climate system, and in recent years it has become warmer, fresher and more acidic. Wind patterns have changed, the sea level has risen and currents have moved. All these changes are having an impact on global climate conditions.

Tangaroa also towed a Continuous Plankton Recorder, an ingenious machine shaped like a fish that collects plankton between two spools of silk. Plankton are sensitive to environmental change and provide an early warning indicator of the health of the Southern Ocean.

The CTD data will be analysed in collaboration with the Hobart-based Antarctic Climate and Ecosystems Cooperative Research Centre, in which NIWA is a core partner. The Australian centre and the French Laboratorie d'Oceanographie et du Climat (L'ocean) funded research for this voyage, along with NIWA.

Understanding the role of Antarctica and the Southern Ocean in determining New Zealand's climate is one of 10 National Science Challenges announced by the Government in May. NIWA is to take a key role in this challenge.

FIND OUT MORE

To learn more about the Mertz Polynya voyage, visit: niwa.co.nz/our-science/coasts-and-oceans/mertz-polynya-voyage

NIWA scientist Dr John Clayton applies a low concentration of diquat (a herbicide) to control aquatic weeds in Lake Okataina. The red colour is due to a tracer dye, which is used to track the herbicide's movement. Diquat is a plant-specific herbicide that is safe for all other aquatic life.

Tracey Burton

BENEFITS OF CORE FUNDING INVESTMENT

This section reports only on the core funding component of the Statement of Corporate Intent (SCI) programmes, which have associated research (e.g., Ministry of Business, Innovation and Employment and Innovation contestable projects) and stakeholder-funded activities (e.g., co-funding). The sector benefits column focuses on the core-funded element of the programme. Detailed descriptions of three key innovations in each Statement of Core Purpose (SCP) outcome area are given in the Our Science section on pages 18–41.

The SCP outcomes:

1. Increase economic growth through the sustainable management and use of aquatic resources.
2. Grow renewable energy production through developing a greater understanding of renewable aquatic and atmospheric energy resources.
3. Increase the resilience of New Zealand and southwest Pacific islands to tsunami and weather and climate hazards, including drought, floods and sea-level change.
4. Enable New Zealand to adapt to the impacts and exploit the opportunities of climate variability and change and mitigate changes in atmospheric composition from greenhouse gases and air pollutants.
5. Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity.
6. Increase understanding of the Antarctic and Southern Ocean climate, cryosphere, oceans and ecosystems and their longer-term impact on New Zealand.

Aquaculture

MBIE priority area: Primary industry productivity and sustainability

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Develop reliable and efficient techniques for commercial-scale production of established and emerging high-value aquaculture species.	Production information and economic models enable robust investment decisions to be made by government and investors intending to commercialise finfish species. Research has resulted in measurable economic gains by existing industry. A key area of application is in Northland.	1	2,130,000	2,588,000
Develop monitoring tools and management systems that quantify and minimise both the environmental effects of aquaculture and the risks to aquaculture from environmental stressors.	The commercial management of mussel production in key areas is enhanced by showing the influence of climate over farming practices. Developed models and tools have become essential for government, regional councils and industry in the planning, siting and monitoring of marine farms.	1, 5	1,330,000	1,078,235
Develop breeding and genetic technologies and apply these to the development of elite stocks that provide the New Zealand industry with sustained competitive advantage.	Selective breeding has produced elite paua and finfish broodstock to improve the growth performance of commercial stocks. Genetic information and genomic resources have been applied for multiple commercial species to improve efficiency and performance, resulting in improved economic metrics for existing industry and facilitating its future development.	1	1,490,000	1,071,732

Fisheries

MBIE priority area: Primary industry productivity and sustainability

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Develop and apply stock monitoring and assessment methodologies for New Zealand's fisheries.	Advice to stakeholders is based on state-of-the-art software and techniques to enable monitoring and prediction of changes in fish population biology, fish-stock biomass, and size and age composition. New Zealand fisheries continue to be recognised internationally as sustainably managed, which brings enhanced market opportunities, and this programme is an important contributor to that recognition.	1	550,000	554,000
Develop and apply standardised methodologies to monitor and assess international fisheries outside the New Zealand EEZ and determine the environmental effects of fishing.	Important contribution to the management and sustainability of the toothfish fishery in the Ross Sea region.	1	30,000	30,000
Determine the impact of fisheries on the environment to inform an ecosystem-based approach to fisheries management and contribute to broader ecosystem-based management approaches.	A range of tools is used to efficiently deliver information to end users using both web-based and desktop computer tools, and helps improve management and enhance the economic benefit of living marine resources.	1, 5	600,000	600,000
Enhance fisheries value and market access by determining fishing practices that reduce adverse effects on both the environment and non-target species.	Value is added by minimising bycatch, understanding the potential ecological impacts of bycatch, assessing under-developed fisheries and facilitating industry monitoring of fishery stocks.	1	300,000	300,000

Coasts and Oceans

MBIE priority areas: Marine resources and ecosystems; Mineral resources

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Marine physical resources: Discovery and quantitative characterisation of the marine geological and hydrodynamic energy resources of New Zealand, the Ross Sea region and the Southern Ocean and the physical processes that underpin them.	Improved knowledge of the shape and composition of the seabed, and improved access by industry and government agencies to seafloor data, enables better management of the environment and utilisation of seabed resources. For example, the programme has facilitated Environmental Impact Assessments and planning for the oil and mineral industries.	1, 5	2,120,000	2,485,185
Marine biological resources: Discovery and definition of the marine biota of New Zealand, the Ross Sea region and the Southern Ocean, the physical and biogeochemical processes that sustain them, and the ecosystem services they provide.	The programme is generating a greater understanding of the biological resources in New Zealand's marine estate (overall biodiversity, distribution of resources in space and time, and biological functioning and interdependencies). Knowledge of new taxa and the distributions and ranges of species present is vital for many science programmes, and is supporting decision making by central government agencies, commercial companies, regional government and others, particularly in relation to biodiversity and biosecurity.	1, 5	4,100,000	4,224,195
Managing marine stressors: Quantifying and predicting the effects of natural variability, climate change and anthropogenic stressors to enable ecosystem-based approaches to the management of New Zealand's marine resources.	Information and support tools on habitats and ecosystem services underlie spatial-management processes (e.g., in the Hauraki Gulf). Indices that represent ecosystem health and functioning are being used or trialled for State of the Environment reporting by two large regional councils. The programme helps resource managers to make decisions that balance resource use and the maintenance of biodiversity when there are multiple resource users with varying societal, economic and cultural values.	5, 6	2,150,000	1,606,830
Marine biosecurity: Identifying and evaluating biosecurity threats to marine ecosystems from non-indigenous species and developing tools to reduce establishment and mitigate impacts.	A wide variety of novel tools and information enable robust estimates of aquatic biosecurity risks, effective pest surveillance and monitoring, and the development and implementation of effective, socially and environmentally acceptable mitigation options. Information on biosecurity risks has contributed to the development of guidelines for shipping by the International Maritime Organization, and to proposed regulatory regimes for biofouling in several countries. Developed survey tools and capability are contributing to the active management of marine pests by central government and a range of regional/unitary councils.	5	1,360,000	1,307,521

Freshwater and Estuaries

MBIE priority area: Land and freshwater resources

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Water resources: Understand and predict the hydrological cycle (how much water, where and when) to improve water management.	Reliable information on water resources (including snow) is fundamental to good management decisions. The programme has contributed to better decisions on major water-resource developments through the uptake and use of decision-support and other tools by regional councils and industry.	1, 5	110,000	110,000
Sustainable water allocation: Understand and predict effects of human use and modification of rivers and groundwater systems for sustainable allocation.	Management tools help identify effects of complex water use, set appropriate flow levels and quantify trade-offs between water allocated to in-stream values and out-of-stream uses. One developed model is being used in a variety of regions to plan for integrated river-channel management, considering the effects of, for example, gravel extraction, floodway management, coastal nourishment with sand and gravel, and the superimposed effects of proposed water-storage schemes. Approaches and models are being used in the Ministry for the Environment (MfE) National Objectives Framework process and for evaluating the trade-offs of various combinations of water use limits.	1, 5	2,170,000	2,172,377
Causes and effects of water quality degradation: Understand and predict the sources of contaminants, technologies to clean up the sources and consequences of water-quality degradation for aquatic ecosystems and human uses of water.	Work has focused on the National Policy Statement on Freshwater Management and on the need for councils to set limits on contaminants in land runoff to meet standards and to manage cumulative effects in estuarine and coastal waters. A joint presentation and report to Government on technology options for agricultural production and sustainable water quality was underpinned by the development of effective runoff mitigation methods. Research results are being used by a regional council to develop policies for managing future irrigation. Models and databases have been developed for managing urban runoff as a tool for enabling metropolitan growth with minimal water-resource degradation.	1, 5	350,000	318,079
Catchments to estuaries: Understand and predict the functional connections between catchments and estuaries to improve diffuse-source contaminant management.	The programme has increased access to science-based tools for regional council managers, which this year included training in methods for determining the sources of estuarine sediments, and implementation of web-based, real-time monitoring systems in estuarine environments. A fully three-dimensional coupled hydrodynamic/sediment transport model of a major New Zealand harbour was completed and is now being considered by the council for managing a number of pressing issues (e.g., assessing risk of bathing-beach contamination and scoping possible eutrophication issues).	5	260,000	356,860
Freshwater biosecurity: Identify and evaluate threats from non-indigenous species and minimise risks of their establishment, and develop tools to mitigate their impacts.	The programme has been instrumental in reducing the threat and spread from invasive aquatic plant species in major catchments (e.g., Waitaki) and lakes (e.g., Wanaka, Wakatipu and Waikaremoana) by providing tools and management strategies that control existing pest problems. Tools include targeted surveillance strategies and a transparent model for prioritising weed-control actions. In conjunction with work by Ministry for Primary Industries (MPI) and other agencies, the programme has been crucial in stopping the spread of highly-invasive weed species, and has developed and refined an effective tool that has been adopted nationally to monitor ecosystem health in freshwater bodies around the country. The strategic management of aquatic pests has enhanced ecosystem health in a range of lakes nationally.	5	650,000	650,000
Ensuring ecosystem health: Develop techniques for biodiversity enhancement, rehabilitation and protection of freshwater values under future economic growth scenarios.	No core funding in 2012/13.	5	—	—

Hazards

MBIE priority area: Hazards

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Develop predictive models of weather-related hazards and incorporate them into an operational multi-hazard forecasting system.	A forecasting and information-delivery system is providing end users with direct access to decision-enabling tools for use in a wide range of sectors (e.g., urban coastal planning, ship operations, horticulture, river floods, snow effects on infrastructure and fire in the rural landscape). This contributes to improved risk assessments of the likely occurrence of infrequent weather-related hazard events.	3	3,130,000	3,297,650
Evaluate the risk, impacts and potential losses due to weather-related hazards to inform planning for mitigation and emergency response.	Contributes quantitative natural-hazard impact and loss-modelling requirements of New Zealand and the Pacific Islands, to inform decision making on managing or planning for the adverse effects of weather-related and marine geological natural hazards. Developed products (e.g., hazard-exposure maps) have been included in local government plans and will contribute to engineering development standards, including snow loadings on buildings and infrastructure, and wind loadings. Tools relating to coastal inundation and sea-level rise have been used directly by a number of councils, and will guide building regulations, LIM property reports and design of coastal infrastructure.	3	1,150,000	1,200,000

Atmosphere

MBIE priority areas: Climate and atmosphere; Antarctica

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Improve long-term predictions of global change.	The programme informs the international science community and national stakeholders about the state of the atmosphere in the New Zealand region. The long-term high-quality measurements (in Wellington, Otago and Antarctica) are used by the international atmospheric research community to detect composition variability and change, and test climate models. These are the most comprehensive set of internationally recognised high-quality measurements in the Southern Hemisphere, and New Zealand has international leadership in some measurements.	4, 6	2,300,000	2,234,000
Determine the role of oceans in greenhouse gas exchange, improve global models and inform geoengineering options.	Data on the variability of CO_2 uptake by the oceans in the southwest Pacific region are used in regional carbon models and by the international carbon research community. National and international researchers and policymakers are informed on ocean acidification and ocean fertilisation (geoengineering).	4, 6	950,000	950,000
Quantify New Zealand's greenhouse gas emissions to improve national inventories and validate mitigation options.	Long-term, high-precision measurement of CO_2 and improved assessments of agricultural emission and mitigation efficacy, help measure and verify the efficacy of mitigation strategies, and inform guidelines for agricultural greenhouse gas emissions. The Lauder site, with its unpolluted footprint, is of key international importance for the TCCON (carbon) network, and provides data that are crucial for ground-based validation of satellite-based carbon measurements.	4	1,270,000	1,336,000
Determine the impacts of changing radiation and air pollutants on human health, and evaluate mitigation options.	A variety of tools (e.g., for determining underlying trends in air quality) have been used in up to 10 urban areas, allowing councils to better plan and meet National Environmental Standards. Key contributions have been made to council planning activities, such as rules regarding risks of traffic pollution being considered in licensing Early Childhood Education Centres.	4	1,070,000	1,070,000

Te Kūwaha

MBIE priority area: Land and freshwater resources

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Develop tools for the management and restoration of aquatic taonga species.	Facilitates the effective participation of Māori in aquatic resource management, and benefits the health and wellbeing of taonga species and Māori communities. This includes implementation of taonga/customary species-management and restoration strategies, use of frameworks and tools to monitor the success of restoration initiatives, and use of databases and decision-support tools for Māori.	1, 5	150,000	200,000
Develop knowledge and tools which increase investment and returns from the Māori economy.	Science expertise has been applied across the various sectors in Māori economic development, including dairy/sheep and beef farming. This year saw the implementation of an on-farm decision-support tool, based on environmental forecasting, which adds value to Māori-owned farms by aiding operational decisions to maximise efficiencies and opportunities.	1, 5	200,000	200,000

Environmental Information

MBIE priority area: Science collections and infrastructure

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Develop innovative environmental-monitoring technologies, demonstrate these through reference sites, and work with other agencies to ensure consistent and robust environmental monitoring across New Zealand.	Robust, high-quality data from this programme contributes to NIWA projects and advice, international data repositories and projects undertaken by external agencies. A greater emphasis now on innovation and benchmark sites will facilitate an improved, more collaborative collective response to New Zealand's freshwater-monitoring challenges.	1–5	4,600,000	4,580,000
Implement and maintain robust information infrastructures to provide future-proof archives of New Zealand's climate, freshwater, marine and biological information.	A robust information infrastructure enables NIWA's environmental data to be managed throughout the entire data life-cycle so that it is discoverable, robust and reusable. It ensures the quality and integrity of New Zealand's environmental information for the benefit of all New Zealanders.	1–5	1,150,000	1,170,000
Develop state-of-the-art, user-centric delivery services which enable information access and re-use to improve resource management and business decisions.	Development of information-delivery mechanisms (e.g., a standardised set of web-service protocols for information transfer, improvements in web-delivery portals, a metadata catalogue) results in improved discovery and delivery of available data for all stakeholders to use in internal decision making, planning and other processes.	1–5	240,000	240,000

Capability

MBIE priority area: Capability

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
National centre operations and end-user engagement.	NIWA's national centres provide a communications, outreach and technology-transfer framework for NIWA research and services. Each national centre acts as a focal point for effective engagement with key end users, and for the coordination of research in that area for the benefit of New Zealand.	1–5	1,700,000	1,727,136
Key activities to develop capability.	Benefits flow from strengthened international collaboration, building new skills and capabilities, transferring expertise to NIWA and assisting in core research.	1, 3–5	1,500,000	1,457,414

Climate

MBIE priority areas: Climate and atmosphere; Antarctica

SCI programme	Sector benefits	SCP outcome	Budgeted core funding investment ($), 2012	Actual core funding investment ($), 2012
Observe, analyse and document the climate of New Zealand, the southwest Pacific, Southern Ocean and Antarctica – past and present.	The focus is on collecting observations of the atmosphere and ocean that are critical to other climate programmes (e.g., climate modelling, impact studies). The programme supports the quality control and analysis of the data to develop an understanding of the climate system around New Zealand and to detect change. Key information is used by the Government, community and researchers here and overseas to better manage lives and businesses.	4, 6	990,000	959,500
Determine how the climate system influences atmosphere, ocean, ice and hydrosphere conditions in our region, and identify the causes of change.	Fundamental knowledge enhances the modelling and understanding of the climate and ocean circulation around New Zealand, leading to improved conception of vulnerabilities and risk. For example, analysis of an extreme rainfall event in New Zealand found that the available moisture was likely to be 2–6 per cent higher due to anthropogenic greenhouse gases. This implies that New Zealand is more vulnerable in extreme rainfall events under a changing climate.	4	990,000	1,081,000
Improved predictions of climate and climate extremes.	Better predictions of climate and climate extremes, from weeks to a 50–100 year timescale, improve, for example, management of climate-sensitive industries and central and local government risk assessment and planning (e.g., the 2013 drought). Operational Seasonal Climate Outlooks have been provided to industry, regional councils and the public throughout New Zealand. Similar outlook products are produced for the islands of the southwest Pacific. Results are being applied widely in hydrology and impact studies. Contribution is made to the IPCC 5th Assessment Report.	3, 4	1,370,000	1,315,000
Determine vulnerability, impacts, and adaptation to climate variability and changes in New Zealand, the southwest Pacific, Southern Ocean and Antarctica.	The programme is focused on delivering better, more easily understood and more policy-relevant information by climate-sensitive end users. This climate information has been used by a wide range of New Zealand organisations, including local and regional councils, sectors such as dryland farming and health, winter season tourism, engineering consultancies, iwi/hāpu, central government, research institutes, media and the general public to inform, manage and plan their activities, leading to reduced vulnerability of our communities to the risks of climate variability, extreme events and climate change. The programme continues to be an extremely significant and important research and outreach mechanism for climate-based end user-focused information, products and services.	4	390,000	382,800

OUR PEOPLE

An annual Leaders' Forum helps to ensure the NIWA management group has a clear strategic vision for the year ahead

Geoff Osborne

Leadership, accountability and culture

Over the year we put significant effort into strengthening our leadership and defining our culture.

In August 2012, we held our first Leaders' Forum, a significant event for NIWA's entire management group. It provided an opportunity to review our performance and assess upcoming opportunities, and it helped ensure our leadership had a clear vision for the year ahead. We then held roadshows at each of the main centres to carry the discussion about our performance and our direction to all staff.

Before Christmas, the Executive Team launched an initiative to refresh our values and invited all staff to provide input. In total, 230 people attended workshops across the country to help define our new values (see page 54).

NIWA is an equal opportunity employer, and we value the strengths that a diverse workforce provides. We actively engage with employees and their representatives when reviewing and renewing workplace programmes and policies, and this includes union participation in collective bargaining (NIWA had 369 PSA members as at 30 June 2013), and consultation with staff prior to policy changes.

We run a biennial staff survey which measures organisational climate and engagement. The survey provides useful information on staff perceptions of their working environment, and helps identify actions and priorities to improve the way we do things.

Recruitment, selection and induction

Over the course of the year, 17 new positions were created. We had low turnover again, with 39 positions being vacated and filled. Our managers attend a recruitment and selection workshop (a requirement for all hiring managers) to ensure best-practice methods and principles are applied when selecting staff. We pride ourselves on having an impartial employment process to ensure we hire the best person for the job, based on job-relevant requirements.

We understand the importance of induction, and have revitalised our induction process to ensure new employees are properly welcomed and equipped with the knowledge, tools and support they need for the crucial first few months of employment. We conduct a three-month entry interview to check how new staff are finding the work environment, and to identify and resolve any issues.

Employee development and promotion

Our performance management system emphasises employee development. Individual development plans are set with all staff at the beginning of the year, with a progress review at six months, and an end-of-year performance and development review. We have an annual workforce planning process for all national science centres and functions, which includes strategic-talent review and succession planning, resulting in a workforce-development action plan.

We have an in-house leadership and management development programme, which includes workshops on project management, developing others, managing poor performance, leadership and emotional intelligence, and crucial conversations. We also provide workshops in other areas, including science writing, presentation skills, time management and expert-witness training, and we run technical-skills training workshops (e.g., computer programming, statistical analysis, boating and diving) as required.

This year, we spent $359,000 on professional development, an average of $600 per person. We also spent close to $200,000 on professional memberships.

In July 2012, we appointed 35 programme leaders across our national science centres. As front-line managers of science, they play a key role in maintaining and enhancing our research and services, as well as providing mentoring and leadership for staff. Our science group managers also have mentoring and leadership of their group members as a primary responsibility.

This year, 21 level promotions were awarded to staff across the country. The promotions were achieved after cases were extensively reviewed by a panel, before being recommended to the Chief Executive for final review and approval.

Personal development is as important to us as professional development. This year, staff took an average of 10 hours each off work to pursue training or personal development of their choice. Each employee is provided with three leave days a year for personal development.

Employees who resign from NIWA are asked to participate in an exit interview, which provides valuable feedback on their reasons for leaving. They are also invited to join NIWA's Alumni group, to be kept informed of ongoing developments and opportunities at NIWA.

Remuneration and recognition

We are committed to ensuring we attract, retain and motivate high-performing people. We continue to provide an environment that identifies, encourages and rewards excellence, innovation and high-quality services by using a remuneration structure that is competitive, fair and transparent.

We regularly review our internal relativity, and monitor and respond to market movements in remuneration. Last year, about one-third of NIWA staff exceeded expectations and were awarded a merit increase to salary over and above the general adjustment.

In September 2013, staff again had the opportunity to recognise the outstanding work of their colleagues, with the second NIWA Excellence Awards. Twelve winners and ten runners-up were awarded trophies and cash prizes at a ceremony to celebrate the exceptional contribution they made to NIWA during the year. All members of staff were eligible for nomination, and more than 60 nominations were received.

We offer flexible working hours by agreement, to ensure our staff have a work-life balance they are happy with. Eleven per cent of our staff work less than full-time hours, to fit in family and other commitments.

Safe and healthy environment

To build on the achievements of previous years, a new national safety strategy is being implemented to engage the hearts and minds of our staff, as well as meet regulatory and performance needs. The strategy focuses on three key elements: safety leadership (enhancing safety leadership capability), safety systems (increasing system efficiency and effectiveness), and safety behaviour (introducing human-error-prevention practices).

We have developed an environment that supports and encourages employee participation in health and safety. Our elected health and safety representatives play an active part in determining and implementing our workplace safety policies and practices. There is a high level of participation in our staff-wellness programme, and we offer free counselling support to employees experiencing personal difficulties. We collect data on staff disabilities to inform policies and decisions, with the aim of reducing barriers for people with disabilities.

We actively promote a safe and positive working environment, and have a comprehensive unacceptable -behaviour policy, with zero tolerance for harassment and bullying. We also have professional guidelines which set out clear expectations of how we behave, communicate and interact at work.

Spreading the word

This year, more than 6000 media stories mentioned NIWA, including press, radio, websites and television, with a combined advertising space rate of over $16 million. We also made sure our stories were told in less traditional ways.

Our presence on Twitter, Google+, Facebook, YouTube and Vimeo gave us exposure to 47,000 people worldwide. That's in addition to the almost 4.5 million page views our website had during the year.

We sponsored 14 science conferences and eight science and technology fairs, ensuring our name was in front of not only our peers, but future generations of scientists as well.

STAFF STATISTICS

As of 30 June 2013

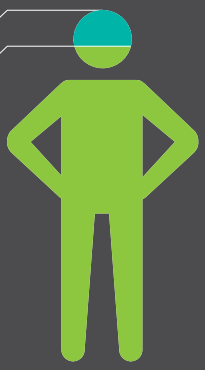
597

NIWA staff

Full time v part time

Part time 65 or 11%

Full time 532 or 89%



Ethnicity

Pacific Island 0.5%

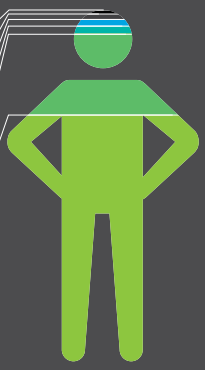
Chinese 1.5%

Indian 1.7%

Māori 3%

Other 23.3%

NZ European 70%



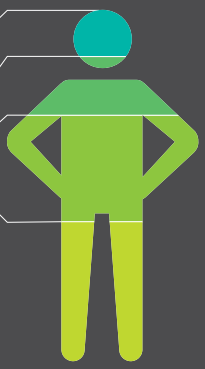
Role

Operational support 69 (12%)

Support 104 (17%)

Technicians 199 (33%)

Scientists 225 (38%)



Highest qualification

Master's degree 73 (12%)

Bachelor's or Honours degree or equivalent 120 (20%)

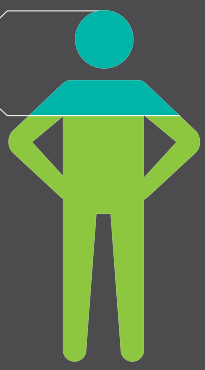
Doctoral degree 177 (30%)

Other (38%)

Gender

Female 185 or 31%

Male 412 or 69%



Age

70+ years 2 (0.3%)

No data 8 (1.3%)

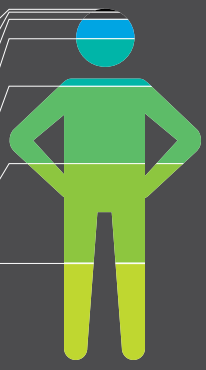
20-29 years 34 (5.7%)

60-69 years 81 (13.6%)

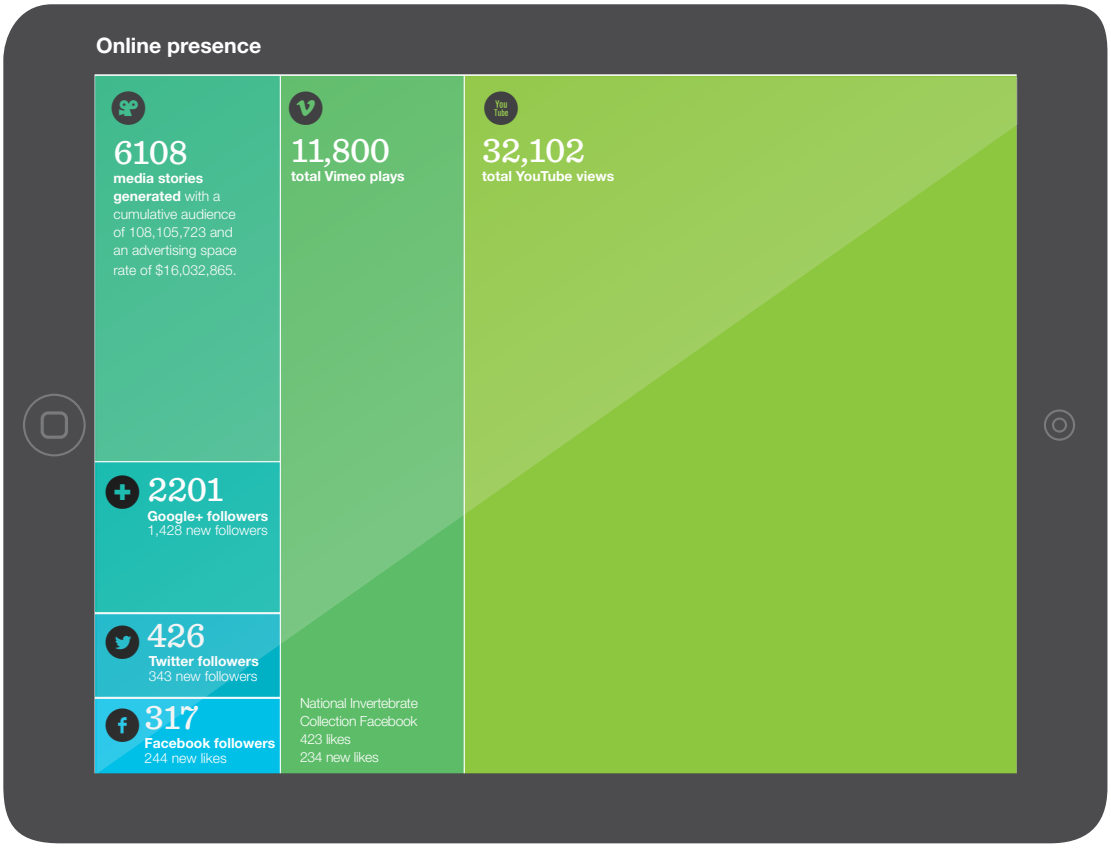
30-39 years 140 (23.5%)

50-59 years 162 (27.1%)

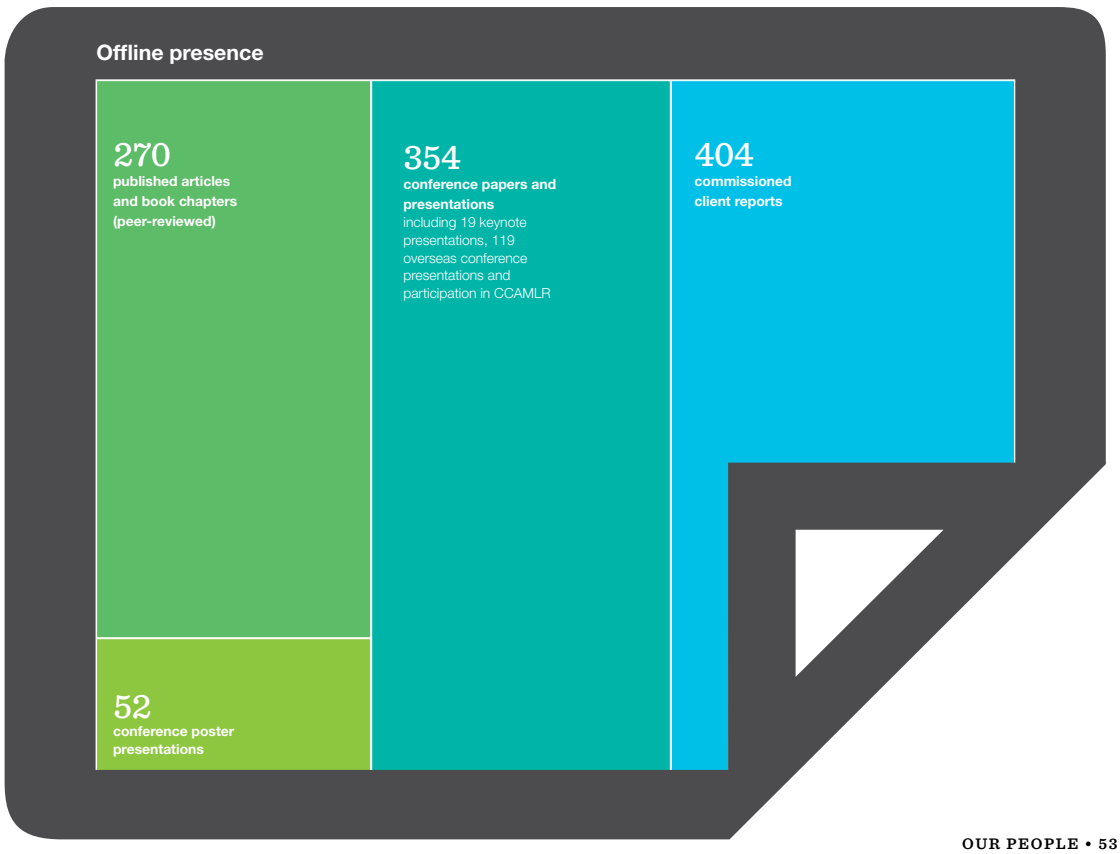
40-49 years 170 (28.5%)



Online presence



Offline presence



NIWA's core values were clarified and refreshed this year in a process that sought input from all staff through a series of workshops around the country. The initiative was part of ongoing efforts to maintain a positive and strong culture, and be clear about what we need to promote, and stand for, in order to continue to be a successful organisation.

Safety

Working safely is paramount at all times.

Zero harm is our safety target for our people and those working with us.

We take personal responsibility for the safety of ourselves and others.

We are always safety conscious, thinking "What am I about to do? What could go wrong? How can I do it safely?"

We maintain high standards of safety in all working environments.

We report all hazards, incidents and near misses, acting on and learning from them.

We continually improve our safety systems and processes.

Excellence

We strive for excellence in everything we do.

We apply the highest standards of rigour to our work.

We are creative and innovative in our thinking and apply leading-edge practices.

We are highly professional in the way we operate.

We are proud of our reputation for high-quality science.

We are efficient, effective and resourceful, seeking to eliminate waste and maximise opportunities.

Customer focus

We provide our customers with an outstanding service and experience.

We recognise that NIWA wouldn't exist without its customers.

We all work together to ensure a positive customer experience.

We value and respect our customers, and act to ensure excellent and enduring relationships with them.

We communicate with our customers openly and proactively.

We deliver on our commitments to customers – in full, on time and within specifications.

We seek customer feedback to help us improve.

Julie Hall

Agility

We are agile, resourceful and responsive to opportunities and challenges.

We actively create, identify and develop new opportunities.

We react quickly and flexibly to changing priorities.

We are positive, solution-focused and future-oriented in our outlook.

We recognise change as continuous, and treat it as an opportunity.

We are committed to continuous learning and improvement.

People & teamwork

We are 'OneNIWA' and work collaboratively for the greater benefit of NIWA and our customers.

We help and support our colleagues, treating each other with courtesy and respect.

We value diversity and respect other cultures.

We value the opinions, knowledge and contributions of others, and celebrate success.

We willingly share our expertise.

We all take responsibility for getting things done.

We listen openly and communicate honestly and constructively.

NIWA's interests and reputation take precedence over advancing our own individual interests and reputation.

Integrity

We are honest, trustworthy and reliable in our work and our relationships with others.

We uphold the highest ethical standards.

We deliver.

We take ownership and are accountable for our actions.

We provide accurate, evidence-based information and advice.

We maintain objectivity at all times, avoiding advocacy and bias.

We are viewed as trusted professionals in our areas of expertise.

We avoid or declare all conflicts of interest.

Our annual NIWA Excellence Awards celebrate the achievements of staff who have made an extraordinary contribution. Staff are nominated by their peers, and finalists are then selected by a representative panel of staff, for ratification by the Executive Team.

Health and Safety

Steve Mercer

Our Wellington Site Safety Administrator is known as the driving force behind the Health and Safety Committee. Steve has long been recognised nationally as an inspirational champion for diving safety, and is widely respected as a mentor to other site safety administrators and for his commitment to improving health and safety at NIWA.

Leadership

Dr Alison MacDiarmid

Alison has worked tirelessly and successfully to build NIWA's credibility and delivery to customers with an interest in seabed resources. She also led investigations into impacts and the development of exploration guidelines to inform government regulators. The key was her leadership of a large and diverse science team, from four NIWA sites, as well as external consultants.

Customer Focus

Alan Porteous

Long celebrated for his climate outreach and applications in New Zealand, Alan has also become the key person developing and managing NIWA's climate-related activities in the Pacific. His consultative approach and sensitivity to stakeholder needs have been instrumental in developing project opportunities and implementing them with a range of partners and clients across the Pacific.

Support Services

Shareen Sharma-Prasad

Described as the quintessential 'quiet achiever', because her work is largely invisible to the wider organisation, Shareen has sole charge of the NIWA payroll. Unfailingly prompt, courteous and helpful, Shareen provides excellent behind-the-scenes service, always demonstrating high standards of accuracy and organisational efficiency.

Project Delivery

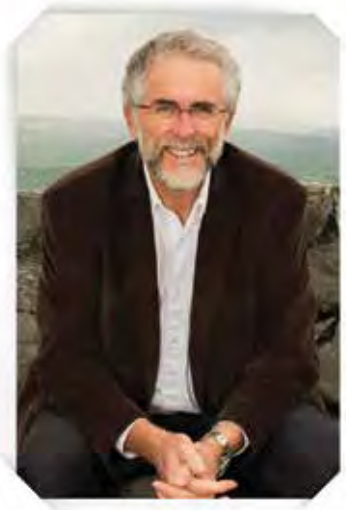
Bernard Miville

Bernard leads NIWA's operational forecasting services, ensuring that a wide range of clients – from farmers and fire fighters to port authorities – have access to our forecasting science in a form that is tailored to meet their requirements. He demonstrates enormous diligence and delivers excellence without fuss.

Early Career Science

Dr Paul Franklin

Paul's rapidly expanding scientific expertise in ecohydraulics and fisheries is now being applied to water allocation through highly-effective advice to regional councils, particularly championing the concept of environmental flows. He leads research on fish habitat, galaxiid restoration, and fish passage, and is part of a team investigating restoration of whitebait habitat in the Waikato River.



Science Communication

Dr David Wratt

David is an outstanding communicator and leader in climate and climate-change science via presentations to many sectors, Ministers and government agencies, television, radio and newspapers. He is New Zealand's representative on the IPCC Bureau, heads the New Zealand Climate Change Centre, and leads the NIWA National Climate Centre, making an unparalleled contribution to science communication.

Operational Innovation

Tim Allen

Tim completely redesigned and overhauled procurement at NIWA, seamlessly replacing manual, paper-based systems with desktop e-purchasing that significantly increased efficiency and reduced transactional costs. He also consolidated suppliers and negotiated substantially better purchasing arrangements, to the considerable benefit of both NIWA and our customers.

Applied Science Excellence

Dr Michael Uddstrom

Michael led the science behind forecasting for weather-related decision making; he championed the purchase of NIWA's supercomputers to enable the research and forecasting; and he realised the benefits of research by applying it to specific user needs. Firefighters, port authorities, kiwifruit growers, power companies, regional councils, farmers, and many other sectors are now benefiting.

Research Excellence

Dr Cliff Law

Cliff is recognised globally as an expert in ocean biogeochemistry. He helped pioneer and participated in major iron fertilisation experiments in many of the world's oceans, and is a world authority on the effectiveness of iron fertilisation as a geoengineering approach to lowering atmospheric carbon dioxide. Cliff was a co-winner of the Prime Minister's Science Prize in 2012 and represents New Zealand at international forums on ocean management.

Extraordinary Achievement Award

Dr Michelle Kelly

In May of this year, Michelle was awarded a DSc – Doctor of Science – from the University of Auckland. Such an honour is rarely conferred. Michelle's was awarded in recognition of her authoritative standing and international eminence resulting from her original contribution of special excellence in her field: the taxonomy, systematics and phylogenetics of sponges.

Lifetime Achievement Award

Tony Bromley

This year, Tony marked 50 years working for NIWA (and our predecessor organisations). He has made a huge contribution to meteorological and air-quality investigations, and to atmospheric sampling and analysis. Tony's work in airborne biosecurity, surveying transmission lines and industrial sites, and countless other field and laboratory activities, has earned him the deep respect of his colleagues.

Special Award: Crispin Middleton

A John Dory is right at home amid the sanctuary of the Poor Knights Marine Reserve, off the east coast of Northland. In the background is the entrance to Northern Arch. The Reserve, created in 1981, is home to an abundance of marine life and attracts recreational divers from all over the world.

NIWA people work in some of the world's most stunning environments. They get to see amazing sites in their day-to-day work. Luckily for us, many of them take their cameras to work.

At our NIWA Excellence Awards, the winners of the NIWA National Photography Competition were announced.

Various media feature photos taken by our staff, including our Annual Report, our website, our calendar and our flagship magazine, *Water & Atmosphere*.

We are very proud of the quality of the photography, with 180 photos submitted by NIWA staff.

Our People: Crispin Middleton

Dawn's light caresses cirrus clouds high above New Zealand's most northerly harbour, Parengarenga, as scientist Meredith Lowe and Masters student Tegan Evans venture out to study juvenile fish that congregate in the extensive seagrass meadows growing in the harbour.

Our Places: Jean Keddy

A spectacular crepuscular ray descends from glowering skies, casting a spotlight on the windswept grandeur of Tapu te Ranga Marine Reserve on Wellington's south coast.

Judges' Choice: James Williams

That's Amore: It's a tight squeeze for these yellow moray eels (*Gymnothorax prasinus*), peering from their crevice home in an underwater cliff at the Mokohinau Islands in the Hauraki Gulf. They seem decidedly unimpressed with the disturbance in their neighbourhood.

Our Work: **Daniel Leduc**

The intricate structure of this adult male nematode of the genus *Metadasynemella* is captured beautifully when magnified 400 times under a compound microscope. The specimen is about 0.75mm across, and was collected from an area on the Chatham Rise, east of mainland New Zealand, rich in phosphorite nodule deposits.

STAFF LOCATIONS

Bream Bay
20

Auckland
70

Hamilton
112

Rotorua
5

Turangi
2

Napier
2

Wanganui
1

Wellington
236

Nelson
16

Greymouth
5

Christchurch
93

Tekapo
1

Lauder
10

Alexandra
2

Dunedin
7

Perth, Australia
15

Bruce Jarvis

Board of Directors
Left to right: Dr Helen Anderson,
Chris Mace (Chairman)
John Morgan (Chief Executive)
Ed Johnson, Helen Robinson,
Prof. Keith Hunter, Jason Shoebridge,
Craig Ellison (Deputy Chairman).

Dr Helen Anderson

Helen Anderson is a board member of DairyNZ, BRANZ and Fulbright New Zealand. She was Chief Executive of the Ministry of Research, Science and Technology for six years, preceded by six years as Chief Scientific Adviser. She chairs advisory boards for LINZ, DIA and the construction sector. She has a PhD in geophysics from Cambridge University and enjoys making public presentations about topical earthquakes.

Chris Mace

Chairman

Chris Mace is an Auckland-based businessman. He chaired the Crown Research Institute ESR in the 1990s and later Antarctica New Zealand. He is Commissioner of the Tertiary Education Commission, a founding trustee and life member of the Sir Peter Blake Trust and continues as a trustee of the Antarctic Heritage Trust. Chris was awarded a CNZM for services to Antarctica and the community and was appointed Chairman of NIWA in July 2009.

John Morgan

Chief Executive

John joined NIWA as Chief Executive in April 2007. He has extensive senior executive and governance experience in public and private sector organisations covering a range of markets and activities including business, science, education and sport. His science sector roles have included Chairman of Science New Zealand, CEO of AgriQuality Ltd, Executive Director of Orica New Zealand Ltd, and Chairman of New Zealand Pharmaceuticals Ltd.

Ed Johnson

Ed Johnson, FInstD, is Chairman of Goldpine Industries Ltd, Indevin Ltd and Port Marlborough New Zealand Ltd, and a director of several entities including Port Otago Ltd. He retired as Chairman and CFO of Shell New Zealand in 2002 and recently retired as Chairman of Fulton Hogan Ltd after 17 years on that board. His commercial interests have spanned the energy, forestry, construction and engineering sectors. In 2001, Ed became the inaugural Honorary Fellow of Massey University's Centre for Business and Sustainable Development and was made a Fellow of the New Zealand Institute of Directors in 2003.

Helen Robinson

Helen Robinson has led many technology companies including as CEO of Microsoft NZ, and as VP APAC for Pivotal Corporation. Helen was the founding CEO of TZ1 Registry, acquired by London-based Markit Group Ltd. Helen chairs The Network for Learning Ltd and other directorships include Sir Ray Avery's Mondiale Technologies Ltd, Open Polytechnic NZ and the New Zealand Business Excellence Foundation.

Prof. Keith Hunter

Keith has been Pro-Vice-Chancellor of Sciences at the University of Otago since the beginning of 2010. Before that, he was Head of the Department of Chemistry. A graduate of Auckland University, Keith joined the department at Otago in August 1979 after five years of PhD and postdoctoral study in Britain and France. His research speciality is chemical oceanography. He is one of New Zealand's delegates to the UN's Scientific Committee on Oceanic Research and a member of the International Council of Science Regional Committee for Asia and the Pacific.

Jason Shoebridge

Jason is Managing Director of TNS New Zealand. He has led consulting assignments across a range of industries and disciplines in New Zealand and overseas. Before his consulting career, Jason held a number of senior commercial and financial-management posts both internationally and in New Zealand, in large corporates and with an international chartered accounting firm.

Craig Ellison

Deputy Chairman

Craig Ellison is a director on several boards, including the Poutama Trust, and chairs the New Zealand Seafood Standards Council, as well as providing consultancy services to a range of clients. Dunedin born and bred, Craig now lives in Wellington but also has commercial interests in Australia. He was deeply involved in the settlement of Māori commercial fisheries claims and maintains an interest in Māori governance structures and resource management.

Dave Allen

Executive Team
Left to right: Michael Parrott, Geoff Baird, Dr Barry Biggs, John Morgan (Chief Executive), Dr Rob Murdoch , Dr Mary-Anne Dehar, Arian de Wit, Dr Bryce Cooper

Michael Parrott

CFO and Company Secretary
BCom, University of Canterbury; CA

Michael is a Chartered Accountant. He began his career with Deloitte in Christchurch, followed by extended periods in London and Wellington, before moving to Westpac where he was a senior member of the specialist Financial Markets Finance Team. He set up a new operational risk function before being appointed Head of Trading Risk Management for all of the bank's financial markets activities in New Zealand. He then spent six years as CFO for TOWER Investments and was appointed CFO at NIWA in January 2013.

Geoff Baird

General Manager, Communications and Marketing
BSc Hons (Ecology), Victoria University of Wellington

Geoff has extensive experience in science publishing and communication from working with the Ministry of Agriculture and Fisheries, MAF Fisheries and NIWA. He became NIWA's Communications Manager in 2003 and General Manager, Communications and Marketing in July 2007, with a focus on reinforcing the values underlying the NIWA brand and demonstrating how NIWA enhances the benefits of New Zealand's natural resources.

Dr Barry Biggs

General Manager, Operations
BSc Hons (Botany and Geology), Victoria University of Wellington; PhD (Stream Ecology), University of Canterbury

Barry is an environmental scientist with 35 years' experience in the assessment of the effects of changes in land use and flows on river ecosystems, particularly on algae and plant growth. He has been extensively involved with planning and running some of New Zealand's largest RMA consenting projects. He has wide project-management experience, was NIWA's Christchurch Regional Manager for three-and-a-half years, Chief Scientist of Environmental Information and Pacific Rim for three years, and has been the General Manager, Operations since July 2008.

John Morgan

Chief Executive

John joined NIWA as Chief Executive in April 2007. He has extensive senior executive and governance experience in public and private sector organisations covering a range of markets and activities including business, science, education and sport. His science sector roles have included Chairman of Science New Zealand, CEO of AgriQuality Ltd, Executive Director of Orica New Zealand Ltd and Chairman of New Zealand Pharmaceuticals Ltd. John is passionate about the role science can play in transforming New Zealand's economy, environment, society and global reputation.

Dr Rob Murdoch

General Manager, Research
PhD (Marine Science), University of Otago

Rob has a specialist interest in oceanography and marine ecology, and has been a practising scientist on projects associated with the Southern Ocean, aquaculture, oil and gas exploration and marine conservation. He has overseen the planning and direction of NIWA's science and the operation of the research vessels since 1999, and helps manage NIWA's relationships with key stakeholders and collaborators.

Dr Mary-Anne Dehar

General Manager, Human Resources
PhD (Psychology), PGDipPsych (Comm), University of Waikato

Mary-Anne is a registered psychologist, specialising in industrial/organisational psychology. Before joining NIWA in 2008, Mary-Anne worked as a senior human resources consultant for 15 years, both in private practice and for several large consulting firms.

Arian de Wit

General Manager, Information and Technology
MSc (Software Engineering), PGDip (Management Studies), University of Waikato

Arian joined NIWA in 1995 and progressed through a number of technical and team-leadership roles to become General Manager for IT in 2007. While working to ensure NIWA's infrastructure can readily adapt to ever-changing scientific and organisational needs, he is also broadening the IT team's focus from managing the technology, to considering how information and processes can be better managed to deliver desired results for NIWA's customers and other stakeholders.

Dr Bryce Cooper

General Manager, Strategy
PhD (Microbiology), University of Waikato

Bryce is a graduate of the London Business School Senior Executive Programme. He has held research leader and regional manager roles in NIWA, and currently oversees NIWA's strategy development, including initiatives to transfer research to end users and the building of partnerships with businesses and central and local government.

SCIENCE MANAGEMENT TEAM

Dr Clive Howard-Williams

Chief Scientist, Freshwater and Estuaries
PhD (Ecology), University of London

Clive is an aquatic ecologist specialising in water quality, lakes and wetlands. He has worked for a number of organisations, including the Max Planck Institute in Germany, Rhodes University in South Africa and the New Zealand DSIR. He is a Fellow of the Royal Society of New Zealand, an adjunct professor at the University of Canterbury and holder of the New Zealand Antarctic Medal.

Andrew Forsythe

Chief Scientist, Aquaculture
DVM, University of Prince Edward Island

Andrew joined NIWA in 2005, bringing with him more than 20 years' experience in the North American and European aquaculture industries. He has extensive expertise in the design and operation of recirculating aquaculture systems, has provided ambulatory veterinary services for commercial and enhancement aquaculture in western Canada, and has managed freshwater production for a major salmon farming company. Andrew took up his current role as NIWA's Chief Scientist, Aquaculture, in 2007.

Dr Barb Hayden

Chief Scientist, Coasts and Oceans
PhD (Marine Biology), University of Otago

Barb has a research background in marine biosecurity and the environmental sustainability of aquaculture. Today she leads NIWA's coasts and oceans research, which focuses on ecosystem-based approaches to managing activities in New Zealand's marine estate, so that economic and social benefits are realised while vulnerable components of the ecosystem are protected.

Dr Jochen Schmidt

Chief Scientist, Environmental Information
PhD (Geography), University of Bonn

Jochen has a background in hydrology, geomorphology, soil science, geo-informatics, and hazards and risk assessment. He worked for Landcare Research between 2001 and 2003 and was instrumental in developing the New Zealand Digital Soil Map ('SMAP'). He joined NIWA in 2003 and coordinates systems for collecting, managing and delivering environmental information – ensuring they are robust and meet best-practice standards.

Dr David Wratt

Chief Scientist, Climate
PhD (Atmospheric Physics), University of Canterbury

David's expertise in climate and meteorology results from a range of applied-research activities in New Zealand, the US, Australia and the Pacific. He has recently focused on climate change science assessment, and climate change impacts and adaptation. David is currently Director of the NZ Climate Change Centre, an adjunct professor at Victoria University, a Companion of the Royal Society of NZ, a member of the Royal Society's NZ Climate Expert Panel and a member of the Bureau of the IPCC.

Dr Mark Bojesen-Trepka

Manager, Marketing and Industry Engagement
BSocSc, MBA, PhD (Marketing and Technology Management), University of Waikato

Mark is an industrial marketer, and has led the marketing, technology-transfer and business-development efforts of a number of firms in a range of industry sectors and markets. Past roles include National Marketing Manager for BHP Steel Building Products and National Marketing Manager for ICI Resins and Adhesives Division.

Dr Rosemary Hurst

Chief Scientist, Fisheries
PhD (Zoology),
Victoria University of Wellington,

Rosemary has worked in fisheries research in New Zealand since 1979. A key past role was Convenor for the Ministry of Agriculture and Fisheries Hoki and Middle Depths Fisheries Stock Assessment Working Groups. She is a specialist in middle depth and inshore fisheries resource surveys and stock assessment, fish communities, and the assessment of climate effects on fisheries. She was a Regional Manager at NIWA Wellington for eight years.

Dr Murray Poulter

Chief Scientist, Atmosphere
Natural Hazards, and Energy
PhD (Physics), University of Canterbury

Murray's expertise as an atmospheric physicist has taken him to Europe, where he researched wave propagation in the atmosphere and space at the University of Lancaster (UK) and Max Planck Institute for Aeronomy (Germany). He undertook similar research in New Zealand, before turning his attention to ocean waves in coastal and air–sea interaction processes, working in Canada, the US and Antarctica. He took on his first management role at NIWA in 1995.

Douglas Ramsay

Manager, Pacific Rim
BEng (Civil Engineering), University of Aberdeen; MSc (Water Engineering), University of Strathclyde; MBA, University of Southern Queensland; CEng; MICE; MCIWEM; FRGS

Doug is a chartered engineer. He joined NIWA in 2003, following roles with HR Wallingford in the UK and the Government of Kosrae in the Federated States of Micronesia. He specialises in coastal hazard management and coordinates NIWA's international commercial work, focusing on the Pacific and Asia regions.

Greg Foothead

General Manager, Vessel Operations
NZCE (Mechanical),
Central Institute of Technology

Greg is a certified automotive engineer. Before joining NIWA Vessels as Engineering Manager in 2004, he managed a marine and industrial supply and repair company. He has also worked for Mitsubishi Motors, in various technical roles, in New Zealand, Australia and Europe. Greg has managed NIWA's research vessels *Tangaroa*, *Kaharoa* and *Ikatere* since December 2010.

Fred Smits

General Manager, Marine Business Services
ME (Civil Engineering),
University of Auckland,

Fred is a geotechnical engineer. He has worked in many countries as a contracts manager for major onshore and offshore civil engineering projects. Fred joined NIWA in 1994 as Marine Business Development Manager. Between 2004 and 2010 he was in charge of NIWA's research vessels, *Tangaroa* and *Kaharoa,* before becoming General Manager, Marine Business Services.

Alan Grey

Manager, MBIE Research
MSc Hons I (Geology),
University of Canterbury

Alan has a science background in ecology and earth sciences. He has extensive experience in research administration and science and technology programme evaluation, both for NIWA (since 1998) and as a programme manager for FRST.
He oversees NIWA's obligations to government funding agencies and its responsibilities for undertaking research for the benefit of all New Zealanders, and evaluation of the impact and value of NIWA research.

OPERATIONS MANAGEMENT TEAM

Ken Becker

Regional Manager, Auckland
BSc Hons (Marine Biology), University of Liverpool; PGDip (Professional Ethics), University of Auckland

Ken has 30 years' experience in marine science. Before joining NIWA as a regional manager in 2005, he worked for Auckland Regional Council on resource management regulation, planning and policy development in water quality, wastewater treatment, stormwater management and water resource allocation.

Dr Michael Bruce

Assistant Regional Manager, Auckland (responsible for Bream Bay)
PhD (Aquaculture), University of Stirling

Michael has 25 years' experience in aquaculture research and working with industry. He joined NIWA in 1999 and was appointed Assistant Regional Manager for Auckland in 2011, with operational responsibility for Bream Bay Aquaculture Park.

Dr David Roper

Regional Manager, Hamilton
PhD (Marine Science), University of Otago

David has over 30 years' experience as an environmental scientist, specialising in marine and freshwater ecology, environmental impact assessment and resource management with NIWA, ECNZ and Mighty River Power. At NIWA David has had experience as a project manager, project director, and group manager, and has been Regional Manager, Hamilton, since 2002.

Dr Andrew Laing

Senior Regional Manager, Wellington and Lauder
PhD (Fluid Dynamics), University of Canterbury

Andrew is a marine meteorologist and physical oceanographer with more than 20 years' research experience with the New Zealand Meteorological Service, in the UK, and at NIWA. He led a research group in NIWA before becoming a full-time regional manager in 2000 and senior regional manager in 2008. His focus for 13 years has been on staff and operations management. He has also represented New Zealand in intergovernmental forums.

Dr Julie Hall

Regional Manager, Wellington
PhD (Aquatic Toxicology), University of Manitoba

Julie is a marine and freshwater biologist. She spent 20 years with DSIR and then NIWA, specialising in phytoplankton, microbial food web and zooplankton studies. She chaired an international research programme for six years and was a group manager at NIWA in Hamilton before joining the Operations Management Team in Wellington in July 2008.

Dr Ken Grange

Regional Manager, Nelson
PhD (Marine Ecology), Florida International University

Ken is a marine ecologist. He has led research into the marine environment of New Zealand's fiords, particularly the ecology of black corals, with the Oceanographic Institute, DSIR, and then NIWA in Wellington. Ken has extensive staff and project-management experience and is currently the Programme Leader for NIWA's Aquaculture Environment Interactions Programme, which includes both core and consultancy funding. He took up the role of Regional Manager, Nelson, in 1994.

Dr Graham Fenwick,

Assistant Regional Manager, Christchurch
Dip BA, PhD (Marine Biology), University of Canterbury

Graham's background in science, business and academia brings a diversity of experiences and perspectives to his role within the Operations Management Team. He also continues to apply his marine biology and crustacean biodiversity expertise to research and consulting problems in shallow marine and groundwater ecosystems. Graham joined the Operations Management Team in 2006.

Charles Pearson

Regional Manager, Christchurch
BSc Hons (Statistics), University of Canterbury; MSc Hons (Engineering Hydrology), National University of Ireland

Charles is a hydrologist. He specialises in the analysis of hydrological and other geophysical and climatological data for purposes such as estimating flood risks. Charles is also the World Meteorological Organization's Hydrological Adviser for New Zealand. He oversees 10 science groups, the instrument systems group and environmental information field teams, and is a project director of about 60 projects.

FINANCIAL INFORMATION

Hinrich Shaefer (right) and PhD student Eleanor Rainsley at the terminus (lowest reach) of Taylor Glacier, Antarctica, near their sampling site for 120,000-year-old ice.

Katja Riedel

The Board of Directors take pleasure in presenting the National Institute of Water & Atmospheric Research Ltd (NIWA) and Group (NIWA Group) Annual Report for the financial year ended 30 June 2013.

Business activities

The NIWA Group provided scientific research and consultancy services in New Zealand and overseas during the financial year. In New Zealand, services were provided to the Ministry of Business, Innovation and Employment and a range of other public- and private-sector customers. Internationally, services were provided by NIWA and its subsidiaries to public- and private-sector customers, predominantly in the USA and Australia.

Results

This financial year the NIWA Group achieved a net profit of $4.6 million (2012: $5.5 million), against a budgeted net profit of $4.1 million. This was achieved on a turnover of $120.7 million (2012: $121.4 million) against budgeted revenue of $120.4 million.

Average shareholders' equity for the year ending 30 June 2013 totalled $98.1 million (2012: $93.0 million). Total average assets were $135.1 million for the year ending 30 June 2013 (2012: $137.2 million).

Group actual performance versus Statement of Corporate Intent (SCI)

for the year ended 30 June

in thousands of New Zealand dollars	Actual 2013	SCI 2013	Actual 2012
Total revenue (includes interest income)	120,784	120,363	121,386
Operating expenses, depreciation, and amortisation	114,076	114,256	113,464
Operating profit before tax	6,581	5,636	7,450
Net profit after tax	4,640	4,053	5,541
Average total assets	135,084	135,370	137,165
Average shareholders' funds	98,097	96,010	92,984
Profitability			
Operating profit margin (%) (EBITDAF/revenue)	15.5	15.9	15.6
Adjusted return on average equity after tax (%) (net surplus/adjusted average equity)	6.2	5.5	7.9
Return on average equity after tax (%) (net surplus/average equity)	4.7	4.2	6.0
Return on assets (%) (EBIT/average total assets)	4.9	4.5	5.8
Profit volatility (%) (non-adjusted ROE)	14.0	14.5	15.2
Forecasting risk (%)	0.6	2.5	3.6
Liquidity and efficiency			
Current ratio	1.2	1.7	0.9
Quick ratio	1.6	1.2	1.2
Financial leverage			
Debt to average equity (%)	36	35	41
Gearing (%)	–	1.7	7
Proprietorship (%) (average shareholders' funds/total assets)	73	71	68

Directors

The appointment of Prof. Keith Hunter on 1 July 2012 was the only change to the Board of Directors for the year ended 30 June 2013. Craig Ellison was reappointed to the Board of Directors on 1 July 2013.

During the financial year ended 30 June 2013, the Board comprised seven independent non-executive Directors (including the Chairman). The Directors' profiles are presented on page 67. Board meetings are held monthly. The Board met formally thirteen times during the financial year.

The Audit, Legislative Compliance & Risk Committee comprises three Directors (the Chairman is an ex-officio member of the Audit Committee). All Board members are invited to attend all Audit, Legislative Compliance & Risk Committee meetings.

Membership and attendance

Director	Date of appointment	Appointment term expires	Board	Audit Committee
Ed Johnson	9 June 2005	30 June 2014	12	4
Helen Robinson	1 July 2008	30 June 2014	13	1
Dr Helen Anderson	1 July 2011	30 June 2014	12	4
Craig Ellison *(Deputy Chairman)*	1 July 2007	30 June 2015	12	5
Chris Mace *(Chairman)*	1 July 2009	30 June 2015	12	3
Jason Shoebridge	1 July 2009	30 June 2015	12	5
Prof. Keith Hunter	1 July 2012	30 June 2015	12	-

Membership of subsidiary Boards as at June 2013

Director	NIWA Vessel Management Ltd	NIWA Australia Pty Ltd	NIWA Environmental Research Institute	Unidata Pty Ltd
Chris Mace	✓*	✓*	✓*	
Craig Ellison	✓	✓	✓	
Dr Helen Anderson	✓	✓	✓	
Ed Johnson	✓	✓	✓	
Prof. Keith Hunter	✓	✓	✓	
Helen Robinson	✓	✓	✓	
Jason Shoebridge	✓	✓	✓	
Dr Bryce Cooper[2]				✓*
David Saunders[1]				✓
Kate Thomson[2] *(resigned November 2012)*				✓
Barry Biggs[2] *(appointed February 2013)*				✓

* Chairman.
[1] Director representing minority interest.
[2] Management members of the parent company.

Auditors

In accordance with Section 21(1) of the Crown Research Institutes Act 1992, the auditors, Deloitte on behalf of the Auditor-General, continue in office. Their audit remuneration and fees paid for other services are detailed in note 5 of the 'Notes to the financial statements'.

Interests register

The following are transaction types recorded in the interests register for the year.

Parent and subsidiary companies

Interested transactions

Any business the NIWA Group has transacted in which a Director has an interest has been carried out on a commercial 'arms-length' basis. Any potential conflict is recorded and minuted in Board meetings. An interests register containing all relevant directorships is updated on a monthly basis.

Directors' remuneration

Details of the Directors' remuneration are provided in the statutory information on page 110.

Use of company information by directors

Pursuant to section 145 of the Companies Act 1993 there were no recorded notices from Directors requesting to use company information received in their capacity as Directors that would not otherwise have been available to them.

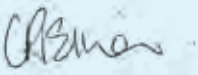
Share dealings

During the year, no Director purchased, disposed of, or had recorded dealings of any equity securities of the NIWA Group.

Directors' loans

There were no recorded loans by the NIWA Group to any Director. The Directors are pleased with the state of affairs of the NIWA Group.

For and on behalf of the Board:



Chris Mace
Chairman

Craig Ellison
Director

19 August 2013

Statement of comprehensive income

for the year ended 30 June 2013

in thousands of New Zealand dollars	Notes	Group 2013 Actual	Group 2013 SCI Budget	Group 2012 Actual	Parent 2013 Actual	Parent 2012 Actual
Revenues and other gains	4					
Research		62,739	61,393	62,358	57,239	57,494
Applied science		57,820	58,970	57,384	52,047	48,652
Other gains		121	–	1,562	121	1,562
Total income		**120,680**	**120,363**	**121,304**	**109,407**	**107,708**
Operating expenses	5					
Employee benefits expense		(59,331)	(60,644)	(60,690)	(52,356)	(54,103)
Other expenses		(42,657)	(40,633)	(41,697)	(43,883)	(40,275)
		(101,988)	**(101,277)**	**(102,387)**	**(96,239)**	**(94,378)**
Profit/(loss) before interest, income tax, depreciation, and amortisation		**18,692**	**19,086**	**18,917**	**13,168**	**13,330**
Depreciation and impairment	15	(11,882)	(12,848)	(10,995)	(8,516)	(8,026)
Amortisation	17	(205)	(131)	(82)	(192)	(81)
Profit/(loss) before interest and income tax		**6,605**	**6,107**	**7,840**	**4,460**	**5,223**
Interest income		104	13	82	75	37
Finance expense		(128)	(484)	(472)	(84)	(434)
Net interest and other financing income/(expense)	6	**(24)**	**(471)**	**(390)**	**(9)**	**(397)**
Profit/(loss) before income tax		**6,581**	**5,636**	**7,450**	**4,451**	**4,826**
Income tax credit/(expense)	7	(1,941)	(1,583)	(1,909)	(1,448)	(1,306)
Profit/(loss) for the period		**4,640**	**4,053**	**5,541**	**3,003**	**3,520**
Other comprehensive income						
Foreign currency translation differences for foreign operations		37	–	12	–	–
Total comprehensive income for the period		**4,677**	**4,053**	**5,553**	**3,003**	**3,520**
Profit/(loss) attributable to:						
Parent interest		4,617	3,933	5,516	3,003	3,520
Non-controlling interest		23	120	25	–	–
Profit for the period		**4,640**	**4,053**	**5,541**	**3,003**	**3,520**
Total comprehensive income attributable to:						
Parent interest		4,654	3,933	5,528	3,003	3,520
Non-controlling interest		23	120	25	–	–
Total comprehensive income for the period		**4,677**	**4,053**	**5,553**	**3,003**	**3,520**

The accompanying 'Notes to the financial statements' are an integral part of, and should be read in conjunction with, these financial statements.

Statement of changes in equity

for the year ended 30 June 2013

Group in thousands of New Zealand dollars	Share capital	Retained earnings	Non-controlling interest	Foreign currency translation reserve	Total equity
Balance at 1 July 2011	**24,799**	**65,445**	**128**	**(166)**	**90,206**
Profit for the year	–	5,516	25	–	5,541
Translation of foreign operations	–	–	–	12	12
Total comprehensive income	–	5,516	25	12	5,553
Balance at 30 June 2012	**24,799**	**70,961**	**153**	**(154)**	**95,759**
Balance at 1 July 2012	**24,799**	**70,961**	**153**	**(154)**	**95,759**
Profit for the year	–	4,617	23	–	4,640
Translation of foreign operations	–	–	–	37	37
Total comprehensive income	–	4,617	23	37	4,677
Balance at 30 June 2013	**24,799**	**75,578**	**176**	**(117)**	**100,436**

Parent in thousands of New Zealand dollars	Share capital	Retained earnings	Total equity
Balance at 1 July 2011	**24,799**	**53,053**	**77,852**
Profit for the year	–	3,520	3,520
Total comprehensive income	–	3,520	3,520
Balance at 30 June 2012	**24,799**	**56,573**	**81,372**
Balance at 1 July 2012	**24,799**	**56,573**	**81,372**
Profit for the year	–	3,003	3,003
Total comprehensive income	–	3,003	3,003
Balance at 30 June 2013	**24,799**	**59,576**	**84,375**

The accompanying 'Notes to the financial statements' are an integral part of, and should be read in conjunction with, these financial statements.

Statement of financial position

as at 30 June 2013

in thousands of New Zealand dollars	Note	Group 2013 Actual	Group 2013 SCI Budget	Group 2012 Actual	Parent 2013 Actual	Parent 2012 Actual
Equity and liabilities						
Equity						
Share capital	8	24,799	24,799	24,799	24,799	24,799
Equity reserves		75,461	73,084	70,807	59,576	56,573
Shareholders' interest		**100,260**	**97,883**	**95,606**	**84,375**	**81,372**
Non-controlling interest		176	154	153	–	–
Total equity		**100,436**	**98,037**	**95,759**	**84,375**	**81,372**
Non-current liabilities						
Unsecured loans	9	–	–	380	–	–
Provision for employee entitlements	10	486	674	624	372	517
Deferred tax liability	11	7,813	6,212	6,666	5,750	5,137
Total non-current liabilities		**8,299**	**6,886**	**7,670**	**6,122**	**5,654**
Current liabilities						
Unsecured loans	9	395	417	–	–	–
Payables and accruals	12	13,327	14,336	10,454	11,969	9,213
Revenue in advance	12	4,367	3,793	3,998	4,356	3,998
Borrowings	13	–	1,745	7,500	–	7,500
Provision for employee entitlements	10	1,175	1,131	1,244	1,035	1,133
Accrued employee entitlements	10	7,684	8,000	7,860	6,732	7,020
Intercompany	14	–	–	–	–	2
Taxation payable		–	–	–	317	–
Total current liabilities		**26,948**	**29,422**	**31,056**	**24,409**	**28,866**
Total equity and liabilities		**135,683**	**134,345**	**134,485**	**114,906**	**115,892**

The accompanying 'Notes to the financial statements' are an integral part of, and should be read in conjunction with, these financial statements.

Statement of financial position *(continued)*

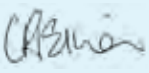
as at 30 June 2013

in thousands of New Zealand dollars	Note	Group 2013 Actual	Group 2013 SCI Budget	Group 2012 Actual	Parent 2013 Actual	Parent 2012 Actual
Assets						
Non-current assets						
Property, plant, and equipment	15	102,942	104,439	103,835	71,519	70,170
Identifiable intangibles	17	548	–	417	523	384
Investments	18	–	–	–	12,709	12,709
Receivables	19	238	–	187	238	187
Prepayments		38	–	24	38	24
Intercompany	14	–	–	–	683	1,072
Total non-current assets		**103,766**	**104,439**	**104,463**	**85,710**	**84,546**
Current assets						
Cash and cash equivalents		4,272	–	2,781	2,937	1,719
Receivables	19	18,023	20,550	17,944	17,692	16,422
Prepayments		2,106	2,000	1,836	1,964	1,710
Taxation receivable		26	285	436	–	183
Uninvoiced receivables	20	5,064	4,789	3,989	4,569	3,979
Inventory	21	2,426	2,282	3,036	1,191	1,669
Intercompany	14	–	–	–	843	5,664
Total current assets		**31,917**	**29,906**	**30,022**	**29,196**	**31,346**
Total assets		**135,683**	**134,345**	**134,485**	**114,906**	**115,892**

The accompanying 'Notes to the financial statements' are an integral part of, and should be read in conjunction with, these financial statements.

For and on behalf of the Board:

Chris Mace
Chairman



Craig Ellison
Director

19 August 2013

National Institute of Water & Atmospheric Research Ltd and Group

Cash flow statement

for the year ended 30 June 2013

in thousands of New Zealand dollars	Note	Group 2013 Actual	Group 2013 SCI Budget	Group 2012 Actual	Parent 2013 Actual	Parent 2012 Actual
Cash flows from operating activities						
Cash was provided from:						
Receipts from customers		119,726	121,269	122,522	107,732	111,430
Dividends received		2	–	3	2	3
Interest received		104	13	82	75	37
Cash was disbursed to:						
Payments to employees and suppliers		(98,982)	(98,831)	(104,771)	(93,767)	(96,758)
Interest paid		(128)	(444)	(472)	(84)	(434)
Taxation (paid)/refund		(384)	(1,829)	(302)	(335)	(244)
Net cash inflow from operating activities	22	**20,338**	**20,178**	**17,062**	**13,623**	**14,034**
Cash flows from investing activities						
Cash was provided from:						
Sale of property, plant and equipment		121	–	33	121	33
Cash was applied to:						
Purchase of property, plant and equipment	15	(11,024)	(12,150)	(7,929)	(9,883)	(7,078)
Purchase of intangible assets	17	(336)	–	(497)	(331)	(463)
Net cash (outflow) in investing activities		**(11,239)**	**(12,150)**	**(8,393)**	**(10,093)**	**(7,508)**
Cash flows from financing activities						
Cash was applied to:						
Borrowing proceeds (repaid)	13	(7,500)	(8,028)	(7,330)	(7,500)	(7,330)
Subsidiary loan proceeds		–	–	–	20,745	17,635
Subsidiary loan (repaid)		–	–	–	(15,537)	(15,594)
Net cash inflow /(outflow) from financing activities		**(7,500)**	**(8,028)**	**(7,330)**	**(2,292)**	**(5,289)**
Net increase/(decrease) in cash and cash equivalents		**1,599**	**–**	**1,339**	**1,238**	**1,237**
Effects of exchange-rate changes on the balance of cash held in foreign currency		(108)	–	(5)	(20)	5
Opening balance of cash and cash equivalents		2,781	–	1,447	1,719	477
Closing cash and cash equivalents balance		**4,272**	**–**	**2,781**	**2,937**	**1,719**
Made up of:						
Cash at bank		2,454	–	1,351	1,119	289
Short-term deposits		1,818	–	1,430	1,818	1,430
Closing cash and cash equivalents balance		**4,272**	**–**	**2,781**	**2,937**	**1,719**

The accompanying 'Notes to the financial statements' are an integral part of, and should be read in conjunction with, these financial statements.

for the year ended 30 June 2013

1. Reporting entity

The National Institute of Water & Atmospheric Research Ltd (NIWA) and Group are profit-oriented. NIWA is a registered company in New Zealand under the Companies Act 1993.

The consolidated (or 'Group') financial statements comprise NIWA (the 'parent company'), its subsidiaries, and the Group's interest in associates and joint ventures. The financial statements for NIWA and the Group are presented in accordance with the requirements of the Crown Research Institutes Act 1992, the Crown Entities Act 2004, the Public Finance Act 1989, the Companies Act 1993, and the Financial Reporting Act 1993. The NIWA financial statements are for the parent company as a separate entity.

2. Nature of activities

The NIWA Group conducts research in water and atmospheric sciences in New Zealand and internationally.

3. Statement of accounting policies

Statement of compliance

The financial statements have been prepared in accordance with New Zealand generally accepted accounting practice (NZ GAAP). They comply with New Zealand equivalents to international financial reporting standards (NZ IFRS) and other applicable financial reporting standards appropriate for profit-oriented entities.

The financial statements comply with international financial reporting standards (IFRS). The financial statements were authorised for issue by the Directors on 19 August 2013.

Basis of preparation

The measurement basis adopted in the preparation of these financial statements is historical cost, except for financial instruments as identified in specific accounting policies below. Cost is based on the fair value of consideration given in exchange for assets.

The presentation currency of the Group and functional currency of the Parent used in the preparation of these financial statements is New Zealand dollars.

Accounting policies are selected and applied in a manner to ensure that the resulting financial information meets the concepts of relevance and reliability, ensuring that the substance of the underlying transaction or event is reported.

The accounting policies have been applied in preparing the financial statements for the year ended 30 June 2013 and the comparative information for the year ended 30 June 2012.

Adoption of new and revised standards

Standards and interpretations effective in the current period

There are no new standards and interpretations effective in the current period with a material impact.

Standards and interpretations approved but not yet in effect

New or revised standards and interpretations that have been approved but are not yet in effect, have not been adopted for the annual reporting period ended 30 June 2013. The adoption of these standards and interpretations is not expected to have a material recognition or measurement impact on the financial statements. These will be applied when they become mandatory.

Accounting judgements and major sources of estimation uncertainty

In the application of the Group's accounting policies, the Directors are required to make judgements, estimates and assumptions about the carrying amounts of assets and liabilities that are not readily apparent from other sources. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results may differ from these estimates.

Judgements in applying accounting policies

The following are the judgements, apart from those involving estimations, that the Directors have made in the process of applying the entity's accounting policies and that have the most significant effect on the amounts recognised in these financial statements:

Revenue recognition

In determining the revenue to be recognised in the year from the rendering of services the Directors have exercised their judgement in respect of the percentage of completion of contracts as outlined in policy (b).

In making their judgement, the Directors considered:

- whether total contract revenue could be measured reliably;
- the probability that economic benefits associated with the contract will flow to the Group;
- whether the contract costs to complete the contract and the stage of contract completion at balance date could be reliably measured; and
- whether the contract costs attributable to the contract can be clearly identified and measured reliably so that the actual contract costs incurred can be compared with prior estimates.

Following review of the Group's contract transactions, the Directors are satisfied that the above criteria have been met and the recognition of the revenue in the current year is appropriate, in conjunction with the recognition of an appropriate uninvoiced receivables/revenue in advance.

Major sources of estimation uncertainty

The following are the key assumptions concerning the future, and other major sources of estimation uncertainty at 30 June 2013, that have a significant risk of resulting in a material adjustment to the carrying amounts of assets and liabilities within the next financial year:

Useful lives of property, plant and equipment

As described in policy (l) and note 15, the Group reviews the estimated useful lives of property, plant and equipment during each annual reporting period.

Significant accounting policies

The following significant accounting policies have been adopted in the preparation and presentation of the financial reports and have been applied consistently to all periods, unless otherwise stated.

(a) Basis of consolidation

The Group financial statements incorporate the financial statements of the company and entities (including special purpose entities) controlled by the Company (its subsidiaries). Control is achieved where the Company has the power to govern the financial and operating policies of an entity so as to obtain benefits from its activities.

Non-controlling interests in the net assets of the consolidated subsidiaries may be initially measured either at fair value or at the non-controlling interest's proportionate share of the fair value of the acquirer's identifiable net assets. The choice of measurement basis is made on an acquisition-by-acquisition basis. Subsequent to acquisition, non-controlling interests consist of the amount attributed to such interests at initial recognition and the non-controlling interest's share of changes in equity since the date of the combination. Total comprehensive income is attributed to non-controlling interests even if this results in the non-controlling interests having a deficit balance.

The results of subsidiaries acquired or disposed of during the year are included in profit or loss from the effective date of acquisition or up to the effective date of disposal, as appropriate. Where necessary, adjustments are made to the financial statements of subsidiaries to bring the accounting policies used into line with those used by other members of the Group.

All intra-group transactions, balances, income and expenses are eliminated in full on consolidation.

Changes in the Group's interests in a subsidiary that do not result in a loss of control are accounted for as equity transactions. Any difference between the amount by which the non-controlling interests are adjusted and the fair value of the consideration paid or received is recognised directly in equity and attributed to owners of the Company.

When the Group no longer has control of a subsidiary, the profit or loss on disposal is calculated as the difference between:

1. the aggregate of the fair value of the consideration received and the fair value of any retained interest; and
2. the previous carrying amount of the assets (including goodwill), and liabilities of the subsidiary and any non-controlling interests.

Amounts previously recognised in other comprehensive income in relation to the subsidiary are accounted for (i.e., reclassified to profit or loss or transferred directly to retained earnings) in the same manner as would be required if the relevant assets or liabilities were disposed of. The fair value of any investment retained in the former subsidiary at the date when control is lost is regarded as the fair value on initial recognition for subsequent accounting under NZ IAS 39 Financial Instruments: Recognition and Measurement, or, when applicable, the cost on initial recognition of an investment in an associate or jointly controlled entity.

Investments in subsidiaries are recorded at cost less any impairment in the parent company's financial statements.

i) Accounting for jointly controlled operations

Where the Group has joint control in a jointly controlled operation, the Group recognises the assets that it controls and the liabilities that it incurs, along with expenses that it incurs and the Group's share of income it earns from the sale of goods and services by the joint venture.

ii) Accounting for goodwill

Goodwill arising on the acquisition of a subsidiary or jointly controlled entity is recognised as an asset at the date that control is acquired (the acquisition date). Goodwill is measured as the excess of the sum of the consideration transferred, the amount of any non-controlling interest in the acquiree, and the fair value of the acquirer's previously-held equity interest (if any) in the acquiree over the fair value of the identifiable net assets recognised.

If, after reassessment, the Group's interest in the fair value of the acquiree's identifiable net assets exceeds the sum of the consideration transferred, the amount of any non-controlling interests in the acquiree and the fair value of the acquirer's previously-held equity interest (if any) in the acquiree, the excess is recognised immediately in profit or loss as a bargain purchase gain.

Goodwill is not amortised, but is reviewed for impairment at least annually. For the purpose of impairment testing, goodwill is allocated to each of the Group's cash-generating units expected to benefit from the synergies of the combination. Cash-generating units to which goodwill has been allocated are tested for impairment annually, or more frequently when there is an indication that the unit may be impaired. The recoverable amount is the higher of fair value less cost to sell and value in use. If the recoverable amount of the cash-generating unit is less than the carrying amount of the unit, the impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the unit and then to the other assets of the unit pro rata on the basis of the carrying amount of each asset in the unit. Any impairment loss is recognised immediately in profit or loss and is not subsequently reversed.

On disposal of a subsidiary or jointly controlled entity, the attributable amount of goodwill is included in the determination of the profit or loss on disposal.

(b) Revenue recognition

Rendering of services

Revenue from services rendered is recognised in profit or loss in proportion to the stage of completion of the transaction at reporting date. The amount of revenue unbilled is represented by 'uninvoiced receivables', which are stated at the proportion to the stage of completion in the statement of financial position. Revenue received but not earned is recognised as revenue in advance on the face of the statement of financial position.

Goods sold

Revenue from the sale of goods is measured at the fair value of the consideration received or receivable, net of returns and allowances. Revenue is recognised when the significant risks and rewards of ownership have been transferred to the buyer, recovery of the consideration is probable, the associated costs and possible return of goods can be estimated reliably and there is no continuing management involvement with the goods.

Transfers of risks and rewards vary depending on the individual terms of the contract sale. For sales of instruments, transfer occurs upon receipt by the customer.

Dividend revenue

Dividend revenue from investments is recognised when the shareholders' right to receive payment has been established.

(c) Government grants

Government grants are assistance by the Government in the form of transfers of resources to the Group in return for past or future compliance with certain conditions relating to the operating activities of the Group. The primary condition is that the Group should undertake research activities as defined under the contractual agreements which award the funding.

Government grants relating to this funding are recognised as income in the profit or loss on a systematic basis in the equivalent period in which the expense is recognised.

Government grants received during the year were $42.854 million GST exclusive (2012: $42.854 million).

(d) Finance costs

Interest expense is accrued on a time basis using the effective interest method.

(e) Goods and services tax (GST)

These financial statements are prepared on a GST-exclusive basis, except for receivables and payables, which are stated GST-inclusive.

(f) Employee benefits

Liabilities for wages and salaries, including non-monetary benefits and annual leave, long service leave, retirement leave, and training leave are recognised when it is probable that settlement will be required and they are capable of being measured reliably. Provisions, in respect of employee benefits, are measured at their nominal values using the remuneration rate expected to apply at settlement. Employee benefits are separated into current and non-current liabilities. Current liabilities are those benefits that are expected to be settled within 12 months of balance date.

Provisions made in respect of employee benefits which are not expected to be settled within 12 months are measured at the present value of the estimated future cash outflows to be made by the Group in respect of services provided by employees up to the reporting date.

(g) Impairment of tangible and intangible assets (excluding goodwill)

Intangible assets that have an indefinite life are not subject to amortisation and are tested annually for impairment. Other assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. If such an indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss. The recoverable amount is the higher of fair value less cost to sell and value in use.

If the recoverable amount of the asset is estimated to be less than its carrying value, the carrying value is reduced to its recoverable amount. An impairment loss is recognised in profit or loss.

Where an impairment loss subsequently reverses, the carrying amount of the asset is increased to the revised recoverable amount, but only to the extent that the increased carrying value does not exceed the carrying amount that would have been recognised if the asset had no impairment loss recognised in the past. This reversal is recognised in profit or loss.

(h) Income tax

The income tax expense for the period is the tax payable on the current period's taxable income, based on the income tax rate for each jurisdiction. This is then adjusted by changes in deferred tax assets and liabilities attributable to temporary differences between the tax bases of assets and liabilities and their carrying amounts in the financial statements, and changes in unused tax losses.

Deferred tax is accounted for using the balance sheet liability method in respect of temporary differences arising from the carrying amount of assets and liabilities in the financial statements and the corresponding tax base of those items. Deferred tax liabilities are generally recognised for all taxable temporary differences. Deferred tax assets are generally recognised for all deductible temporary differences to the extent that it is probable that sufficient taxable amount will be available against which those deductible temporary differences can be utilised.

Deferred tax liabilities are recognised for the taxable temporary differences arising on investment in subsidiaries, associates and joint ventures, except where the consolidated entity is able to control the reversal of the temporary differences and it is probable that the temporary difference will not reverse in the foreseeable future. Deferred tax assets arising from deductible temporary difference from these investments are only recognised to the extent that it is probable there will be sufficient taxable profits against which to utilise the asset, and they are expected to reverse in the foreseeable future.

Such assets and liabilities are not recognised if the temporary difference arises from the initial recognition (other than in a business combination) of other assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply to the period when the asset and liability giving rise to them are realised or settled, based on the tax laws that have been enacted or substantively enacted at balance date.

Current and deferred tax is recognised in profit or loss, except when it relates to items recognised in other comprehensive income or directly in equity, in which case the deferred or current tax is also recognised in other comprehensive income or directly in equity, or where it arises from the initial accounting for a business combination. In the case of a business combination, the tax effect is taken into account in calculating goodwill or in determining the excess of the acquirer's interest in the net fair value of the acquiree's identifiable assets, liabilities and contingent liabilities over the cost of the business combination. The carrying amount of deferred tax assets is reviewed at each balance date and reduced to the extent that it is no longer probable that sufficient taxable profits will be available to allow all or part of the asset to be recovered.

(i) Purchased intangible assets

Purchased identifiable intangible assets, comprising copyrights and software, are recorded at cost less amortisation and impairment. Amortisation is charged on a straight-line basis over their estimated useful lives. The estimated useful life and amortisation method are reviewed each balance date.

The estimated useful life for copyrights is 5 years.

The estimated useful life for software is 3 years.

(j) Development costs

Intangible assets which arise from development costs that meet the following criteria are recognised as an asset in the statement of financial position:

- the product or process is clearly defined and the costs attributable to the product or process can be identified separately and measured reliably;
- the Group has the ability to use or sell the product or process;
- the Group intends to produce and market, or use, the product or process;
- the existence of a market for the product or process or its usefulness to the Group, if it is to be used internally, can be demonstrated; and
- adequate resources exist, or their availability can be demonstrated, to complete the projects and market or use the product or process.

Capitalisation is limited to the amount which, taken together with any further related costs, is likely to be recovered from related future economic benefits. Any excess is recognised as an expense.

All other development and research costs are expensed as incurred.

Subsequent to initial recognition, internally generated intangible assets are reported at cost, less accumulated amortisation and accumulated impairment losses, on the same basis as purchased identifiable intangible assets.

(k) Property, plant and equipment

Property, plant and equipment are stated at cost less accumulated depreciation to date, less any impairment losses.

Expenditure incurred on property, plant and equipment is capitalised where such expenditure will increase or enhance the future economic benefits provided by the assets' existing service potential. Expenditure incurred to maintain future economic benefits is classified as repairs and maintenance.

The gain or loss arising on the disposal or retirement of an item of property, plant and equipment is determined as the difference between the sales proceeds and the carrying amount of the asset and is recognised in profit or loss.

(l) Depreciation

Property, plant and equipment, except for freehold land and work in progress, are depreciated on a straight-line basis at rates estimated to write off the cost of the property, plant and equipment over their estimated useful lives, which are as follows:

Buildings and leasehold improvements	
Buildings	40 years
Leasehold improvements, freehold property	10 years
Leasehold improvements, rented property	5–12 years
Vessels	
RV *Tangaroa* hull	31 years
RV *Kaharoa* hull	16 years
RV *Ikatere* hull	20 years
Plant and equipment	
Plant and equipment	10 years
Scientific equipment	8 years
Electronic data processing equipment	
Supercomputer	8 years
Electronic data processing equipment	3 years
Other	
Office equipment	5 years
Furniture and fittings	10 years
Small boats	10 years
Motor vehicles	6 years

(m) Receivables

Receivables are categorised as loans and receivables.

Loans and receivables are stated at amortised cost using the effective interest rate, less any impairment.

Collectability of receivables is reviewed on an ongoing basis. Debts which are known to be uncollectable are written off against the provision, once approved by the Board of Directors. A provision for doubtful debts is established when there is objective evidence that the Group will not be able to collect all amounts due according to the original terms of receivables. Changes in the carrying amount of the provision are recognised in profit or loss.

(n) Inventory

Inventory is stated at the lower of cost and net realisable value. Cost is calculated on the weighted average basis for consumables and first in first out (FIFO) for finished goods and work in progress.

(o) Foreign currencies

i) Transactions

Transactions in foreign currencies are converted to the functional currency of the Parent, being New Zealand dollars, by applying the spot exchange rate between the functional currency and the foreign currency at the date of transaction. At the end of each reporting period, monetary assets and liabilities are translated to New Zealand dollars using the closing rate of exchange at balance date, and any exchange gains or losses are taken to profit or loss.

ii) Translation of foreign operations

On consolidation, revenues and expenses of foreign operations are translated to New Zealand dollars at the average exchange rates for the period. Assets and liabilities are converted to New Zealand dollars at the rates of exchange ruling at balance date. Exchange rate differences arising from the translation of the foreign operations are recognised in other comprehensive income and accumulated as a separate component of equity in the Group's foreign currency translation reserve. Such exchange differences are reclassified from equity to profit or loss (as a reclassification adjustment) when the foreign operation is disposed of.

(p) Leases

Leases are classified as finance leases whenever the terms of the lease transfer substantially all of the risks and rewards of ownership to the lessee. All other leases are classified as operating leases.

The Group has not contracted for any leases which would be classified as finance leases.

Operating lease payments are recognised on a systematic basis that is representative of the benefit to the Group (straight line).

(q) Statement of cash flows

The statement of cash flows is prepared exclusive of GST, which is consistent with the method used in the statement of comprehensive income. Operating activities comprise the provision of research services, consultancy, and manufacture of scientific instruments and other activities that are not investing or financing activities. Investing activities comprise the purchase and disposal of property, plant and equipment, intangible assets, and advances to subsidiaries. Financing activities are those which result in changes in the size and composition of the capital structure of the Group.

Cash and cash equivalents comprise cash on hand, cash in banks, and investments in the money market, net of outstanding bank overdrafts.

(r) Financial instruments

Derivative financial instruments

The Group may use derivative financial instruments to hedge its exposure to foreign exchange and interest rate risks arising from operational, financing and investing activities.

Derivative financial instruments such as forward exchange contracts are categorised as held for trading (unless they qualify for hedge accounting), and are initially recognised in the statement of financial position at fair value, and transaction costs are expensed immediately. Subsequent to initial recognition, derivative financial instruments are stated at fair value. The gain or loss on re-measurement to fair value is recognised immediately in profit or loss unless the derivative is designated and effective as a hedging instrument, in which event the timing of the recognition in profit or loss depends on the nature of the hedge relationship.

The fair value of outstanding derivative financial instruments at 30 June 2013 is Nil. (2012: Nil).

Other financial assets

Non-derivative financial assets comprise receivables, cash and cash equivalents, uninvoiced receivables, and intercompany, and are initially recorded at fair value plus transaction costs (except for financial assets at fair value through profit or loss, which are initially recorded at fair value).

Financial assets are classified into the following specified categories; classification depends on the nature and purpose of the financial asset and is determined at the time of initial recognition.

Financial assets at fair value through profit or loss:

Financial assets are classified at fair value through profit or loss where the financial asset is either held for trading or it is designated at fair value through profit or loss.

A financial asset is classified as held for trading if:

- it has been incurred principally for the purpose of selling in the near future; or
- it is a derivative that is not designated and effective as a hedge instrument; or
- it is part of an identified portfolio of financial instruments that the Group manages together and has a recent actual pattern of short-term profit-making.

A financial asset other than a financial asset held for trading may be designated as at fair value upon recognition if:

- such designation eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise; or
- the financial asset forms part of a group of financial assets or financial liabilities or both, which is managed and its performance is evaluated on a fair value basis, in accordance with either the Group's documented risk management or investment strategy, and information about the grouping is provided internally on that basis; or
- it forms part of a contract containing one or more embedded derivatives, and it is allowable to be designated at fair value through profit or loss.

Financial assets at fair value through profit or loss are classified as current assets and are stated at fair value, and changes resulting in a gain or loss are recognised in profit or loss.

Loans and receivables

Loans and receivables have fixed or determinable payments and are not quoted in an active market. They arise when the Group provides money, goods or services directly to a debtor with no intention of selling the receivable. They are included in current assets, except for those with maturities greater than 12 months after the statement of financial position date which are classified as a non-current asset. These are subsequently recorded at amortised cost less impairment.

Impairment of financial assets

Financial assets, other than those at fair value through profit or loss, are assessed for indicators of impairment at each balance date. Financial assets are impaired where there is objective evidence that, as a result of one or more events that occurred after the initial recognition of the financial asset, the estimated future cashflows of the investment have been impacted.

For certain categories of financial assets, such as trade receivables, assets that are assessed not to be impaired individually are subsequently assessed for impairment on a collective basis. Objective evidence of impairment for a portfolio of receivables could include the Group's past experience of collecting payments, an increase in the number of delayed payments in the portfolio past the average credit period of 60 days, as well as observable changes in national or local economic conditions that correlate with default on receivables.

For financial assets carried at amortised cost, the amount of the impairment is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the financial asset's original effective interest rate.

The carrying amount of the financial asset is reduced by the impairment loss with the exception of trade receivables, where the carrying amount is reduced through the use of an allowance account. When a trade receivable is considered uncollectible, it is written off against the allowance account. Changes in the carrying amount of the allowance account are recognised in profit or loss.

Financial liabilities

Financial liabilities are classified as either financial liabilities at fair value through profit or loss or other financial liabilities. Financial liabilities are classified as at fair value through profit or loss where the liability is either held for trading or it is designated as at fair value. A financial liability is classified as held for trading if it meets similar criteria as financial assets held for trading.

A financial liability other than a financial liability held for trading may be designated as at fair value through profit or loss upon recognition if it meets similar criteria as financial assets designated as at fair value through profit or loss.

Financial liabilities at fair value are stated at fair value with any resultant gain or loss recognised in profit or loss. This incorporates any interest paid on the financial liability.

Other financial liabilities are initially measured at fair value through profit or loss, net of transaction costs. Other financial liabilities are subsequently measured at amortised cost using the effective-interest method, with interest expense recognised on an effective-interest basis.

The effective-interest method is the method of calculating the amortised cost of a financial liability and of allocating interest expense over the relevant period. The effective-interest rate is the rate that discounts estimated future cash payments through the expected life of the financial liability, or, where appropriate, a shorter period to the net carrying amount of the financial liability.

The Group derecognises financial liabilities when, and only when, the Group's obligations are discharged, cancelled or they expire.

(s) Changes in accounting policies

There have been no changes in accounting policies this period.

4. Revenues and other gains

Revenue

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Sale of goods	5,375	9,100	2,403	2,400
Rendering of services	115,181	110,639	106,880	103,743
Dividends	3	3	3	3
Total operating revenue	**120,559**	**119,742**	**109,286**	**106,146**

Other gains

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Net gain on sale from property, plant and equipment	121	33	121	33
Insurance proceeds	–	1,529	–	1,529
Total other gains	**121**	**1,562**	**121**	**1,562**

5. Operating expenses and other gains

Employee benefit expense

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Defined contribution plans	2,549	2,577	2,249	2,306
Termination benefits	1,311	746	1,311	746
Other employee benefits	55,471	57,367	48,796	51,051
Employee benefit expense	**59,331**	**60,690**	**52,356**	**54,103**

Other expenses

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Other expenses include:				
Rental and operating lease costs	2,346	2,295	2,247	2,194
Remuneration of directors	297	297	297	297
Bad debts written off	–	–	–	–

Other gains and (losses) included in operating expenses

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Other expenses include:				
Movement within doubtful debt provision	(83)	(41)	(83)	(41)
Change in the fair value of derivatives	–	–	–	–
Foreign currency gain (loss)	(109)	(28)	(117)	(5)

5. Operating expenses and other gains *(continued)*

Auditor's remuneration

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Auditor's remuneration to Deloitte comprises:				
Audit of the financial statements	166	161	143	139
Other assurance services	–	–	–	–
Total auditor's remuneration	**166**	**161**	**143**	**139**

6. Net interest and other financing income

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Interest income on bank deposits	104	82	75	37
Finance income	**104**	**82**	**75**	**37**
Finance expense	(128)	(472)	(84)	(434)
Net interest and other financing income	**(24)**	**(390)**	**(9)**	**(397)**

7. Income tax

The income tax expense is determined as follows:

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Income tax expense				
Current tax	794	1,419	835	688
Deferred tax relating to temporary differences	1,147	490	613	618
Income tax expense	**1,941**	**1,909**	**1,448**	**1,306**

Reconciliation of income tax expense

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Operating profit before income tax	**6,581**	**7,450**	**4,451**	**4,826**
Tax at current rate of 28%	1,843	2,086	1,246	1,351
Adjustments to taxation:				
Other non-deductible expenses	101	26	88	24
R&D tax concession	(36)	(31)	–	–
Other deferred taxation adjustments	–	15	–	(23)
Under/(over) provision in previous year	33	(187)	114	(46)
Income taxation expense	**1,941**	**1,909**	**1,448**	**1,306**

8. Share capital

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Issued and fully paid capital	24,799	24,799	24,799	24,799
24,798,700 ordinary shares (2012: 24,798,700 ordinary shares)				

All shares carry equal voting and distribution rights; if the company is to be wound down, all proceeds are distributed equally amongst the shareholders.

9. Unsecured loan

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Current loan	395	–	–	–
Non-current loan	–	380	–	–

The loan is unsecured, denominated in Australian dollars, and relates to a vendor finance agreement (Forrester Management Limited and David Saunders) on the acquisition of a subsidiary, Unidata Pty Ltd. The loan is not subject to any interest charge. Repayment will be made when, and in such amounts as, the cash flow and profitability of Unidata Pty Ltd permit, with full repayment due on 7 May 2014. The loan is recognised at amortised cost using the effective interest rate method.

10. Employee entitlements

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Remuneration:				
Salary accrual	2,846	3,030	2,473	2,634
Annual leave	4,838	4,830	4,259	4,385
Training leave	165	167	164	166
Long service leave	1,010	1,077	871	968
Retirement leave	486	624	372	517
Total employee entitlements	**9,345**	**9,728**	**8,139**	**8,670**
Comprising:				
Current	8,859	9,104	7,767	8,153
Non-current	486	624	372	517

The provisions for long service leave, retirement leave and training leave are dependent upon a number of factors that are determined by the expected employment period of employees, current remuneration and the timing of employees using the benefits. Any changes in these assumptions will impact on the carrying amount of the liability. In determining long service leave the employment period is based upon historical length of service to determine the appropriate liability. Training leave is based upon historical usage of the benefit to calculate the likelihood of further benefits incurring.

for the year ended 30 June 2013

11. Deferred tax liability and assets

Deferred tax assets (liabilities) arise from the following:

Group

in thousands of New Zealand dollars As at 30 June 2013	Opening balance	Charged to profit or loss	Closing balance
Temporary differences			
Property, plant and equipment	(7,535)	(595)	(8,130)
Library	11	(1)	10
Uninvoiced receivables	(1,117)	(301)	(1,418)
Employee benefits	1,853	(128)	1,725
Doubtful debts	122	(122)	–
	(6,666)	**(1,147)**	**(7,813)**

in thousands of New Zealand dollars As at 30 June 2012	Opening balance	Charged to profit or loss	Closing balance
Temporary differences			
Property, plant and equipment	(6,677)	(858)	(7,535)
Library	13	(2)	11
Uninvoiced receivables	(1,382)	265	(1,117)
Employee benefits	1,759	94	1,853
Doubtful debts	111	11	122
	(6,176)	**(490)**	**(6,666)**

Parent

in thousands of New Zealand dollars As at 30 June 2013	Opening balance	Charged to profit or loss	Closing balance
Temporary differences			
Property, plant and equipment	(5,753)	(184)	(5,937)
Library	11	(1)	10
Uninvoiced receivables	(1,114)	(165)	(1,279)
Employee benefits	1,597	(141)	1,456
Doubtful debts	122	(122)	–
	(5,137)	**(613)**	**(5,750)**

in thousands of New Zealand dollars As at 30 June 2012	Opening balance	Charged to profit or loss	Closing balance
Temporary differences			
Property, plant and equipment	(4,835)	(918)	(5,753)
Library	12	(1)	11
Uninvoiced receivables	(1,340)	226	(1,114)
Employee benefits	1,533	64	1,597
Doubtful debts	111	11	122
	(4,519)	**(618)**	**(5,137)**

The NIWA Group is not required to establish or maintain an imputation credit account by virtue of its classification as a Crown Research Institute. The Income Tax Act 2007 confirms this.

12. Payables and accruals, and revenue in advance

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Trade payables and accruals	13,327	10,454	11,969	9,213
Revenue in advance	4,367	3,998	4,356	3,998
Total	**17,694**	**14,452**	**16,325**	**13,211**

Trade payables are payable per normal commercial terms.

Revenue in advance relates to contracted services which have been billed in advance, yet not recognised as revenue in the statement of comprehensive income.

13. Borrowings

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Borrowings	–	7,500	–	7,500

The facility is unsecured, but subject to various covenants that were complied with during the year. The facility is operated on an on-call basis and a short-term advance with a limit available to borrow of $10 million and an overdraft facility of $0.5 million (2012: $19.5 million). Interest rates that were applicable during this period are referred to in note 24.

14. Intercompany

in thousands of New Zealand dollars	Parent 2013	Parent 2012
Current asset	843	5,664
Non-current asset	683	1,072
Current liability	–	2

An amount of $843k relates to advances to NIWA Vessel Management Ltd (2012: $5.7 million relates to advances to NIWA Vessel Management Ltd). This is consistent with the Group policy that all surplus funds are managed by NIWA.

Parent Company advanced NIWA Australia Pty Ltd $1k (2012: $338k), and Unidata Pty Ltd $683k (2012: $734k) during the year.

NIWA Environmental Research Institute advanced the Parent Company nil during the year (2012: Parent Company advanced $2k).

All balances are unsecured, have no set repayment terms, and are payable upon demand, and some are not expected to be repaid within one year of balance date. The balances are not subject to interest.

During the year NIWA contracted vessel charters from its subsidiary NIWA Vessel Management Ltd totalling $7.9 million (2012: $6.2 million) and purchased workshop services totalling $43k (2012: $70k). NIWA Vessel Management Ltd contracted services from its Parent, NIWA Science, totalling $471k (2012: $359k).

During the year NIWA provided research services to NIWA Australia Pty Ltd of Nil (2012: $99k).

NIWA provided research services to NIWA Environmental Research Institute of Nil (2012: $2k). NIWA Environmental Research Institute had an accounts payable balance for NIWA of $32k (2012: Nil).

During the year Unidata Pty Ltd contracted services from NIWA totalling $676k (2012: $402k). At balance date, Unidata Pty Ltd had an accounts receivable balance for NIWA of $79k (2012: $52k).

NIWA charged its subsidiaries for administration expenses and management services totalling $1.2 million for the financial year (2012: $1.0 million).

The carrying amount of intercompany balances approximates their fair value.

There were no other significant transactions between any of the companies in the Group.

15. Property, plant and equipment

Group in thousands of New Zealand dollars	Land	Buildings & leasehold improvements	Vessels	Plant & equipment	Electronic data processing equipment	Office equipment	Furniture & fittings	Motor vehicles	Small boats	Work in progress	Total
Cost											
Balance at 1 July 2012	12,450	50,145	39,912	84,387	25,161	8,091	2,193	3,796	3,072	–	229,207
Additions	–	466	555	5,955	1,729	586	42	604	56	1,031	11,024
Disposals	–	–	(284)	(588)	(1,180)	(18)	–	(398)	(62)	–	(2,530)
Foreign currency	–	–	–	(11)	(2)	(3)	(4)	–	–	–	(20)
Balance at 30 June 2013	12,450	50,611	40,183	89,743	25,708	8,656	2,231	4,002	3,066	1,031	237,681
Accumulated depreciation and impairment losses											
Balance at 1 July 2012	–	19,964	12,996	60,909	17,158	7,205	2,019	3,340	1,781	–	125,372
Depreciation charge	–	2,374	2,432	3,941	2,402	410	34	175	114	–	11,882
Disposals	–	–	(265)	(588)	(1,188)	(18)	–	(395)	(61)	–	(2,515)
Balance at 30 June 2013	–	22,338	15,163	64,262	18,372	7,597	2,053	3,120	1,834	–	134,739
Net book value at 30 June 2013	**12,450**	**28,273**	**25,020**	**25,481**	**7,336**	**1,059**	**178**	**882**	**1,232**	**1,031**	**102,942**

Group in thousands of New Zealand dollars	Land	Buildings & leasehold improvements	Vessels	Plant & equipment	Electronic data processing equipment	Office equipment	Furniture & fittings	Motor vehicles	Small boats	Work in progress	Total
Cost											
Balance at 1 July 2011	12,450	49,510	27,938	79,432	24,498	7,942	2,186	3,617	3,089	14,280	224,942
Additions	–	771	524	4,467	1,476	392	7	272	20	–	7,929
Transfers	–	–	11,509	2,771	–	–	–	–	–	(14,280)	–
Disposals	–	(145)	(59)	(2,287)	(815)	(243)	–	(93)	(37)	–	(3,679)
Foreign currency	–	9	–	4	2	–	–	–	–	–	15
Balance at 30 June 2012	12,450	50,145	39,912	84,387	25,161	8,091	2,193	3,796	3,072	–	229,207
Accumulated depreciation and impairment losses											
Balance at 1 July 2011	–	17,694	10,747	59,664	15,628	7,049	1,981	3,293	1,715	–	117,771
Depreciation charge	–	2,400	2,281	3,290	2,343	399	38	140	104	–	10,995
Disposals	–	(130)	(32)	(2,045)	(813)	(243)	–	(93)	(38)	–	(3,394)
Balance at 30 June 2012	–	19,964	12,996	60,909	17,158	7,205	2,019	3,340	1,781	–	125,372
Net book value at 30 June 2012	**12,450**	**30,181**	**26,916**	**23,478**	**8,003**	**886**	**174**	**456**	**1,291**	**–**	**103,835**

15. Property, plant and equipment *(continued)*

Parent in thousands of New Zealand dollars	Land	Buildings & leasehold improvements	Vessels	Plant & equipment	Electronic data processing equipment	Office equipment	Furniture & fittings	Motor vehicles	Small boats	Work in progress	Total
Cost											
Balance at 1 July 2012	12,450	49,953	–	71,535	22,482	7,653	1,729	3,661	1,869	–	171,332
Additions/transfers	–	478	–	5,637	1,711	487	29	462	48	1,031	9,883
Disposals	–	–	–	(541)	(1,127)	(2)	–	(395)	(55)	–	(2,120)
Balance at 30 June 2013	12,450	50,431	–	76,631	23,066	8,138	1,758	3,728	1,862	1,031	179,095
Accumulated depreciation and impairment losses											
Balance at 1 July 2012	–	19,772	–	53,587	14,757	6,837	1,575	3,213	1,421	–	101,162
Depreciation charge	–	2,387	–	3,215	2,267	383	32	169	63	–	8,516
Impairment	–	–	–	–	–	–	–	–	–	–	–
Disposals	–	–	–	(522)	(1,128)	(2)	–	(395)	(55)	–	(2,102)
Balance at 30 June 2013	–	22,159	–	56,280	15,896	7,218	1,607	2,987	1,429	–	107,576
Net book value at 30 June 2013	**12,450**	**28,272**	**–**	**20,351**	**7,170**	**920**	**151**	**741**	**433**	**1,031**	**71,519**

Parent in thousands of New Zealand dollars	Land	Buildings & leasehold improvements	Vessels	Plant & equipment	Electronic data processing equipment	Office equipment	Furniture & fittings	Motor vehicles	Small boats	Work in progress	Total
Cost											
Balance at 1 July 2011	12,450	49,330	–	68,919	22,079	7,557	1,721	3,482	1,866	17	167,421
Additions/transfers	–	768	–	4,482	1,213	332	8	272	20	(17)	7,078
Disposals	–	(145)	–	(1,866)	(810)	(236)	–	(93)	(17)	–	(3,167)
Balance at 30 June 2012	12,450	49,953	–	71,535	22,482	7,653	1,729	3,661	1,869	–	171,332
Accumulated depreciation and impairment losses											
Balance at 1 July 2011	–	17,520	–	52,417	13,324	6,702	1,542	3,170	1,385	–	96,060
Depreciation charge	–	2,393	–	2,796	2,241	373	33	136	54	–	8,026
Impairment	–	–	–	–	–	–	–	–	–	–	–
Disposals	–	(141)	–	(1,626)	(808)	(238)	–	(93)	(18)	–	(2,924)
Balance at 30 June 2012	–	19,772	–	53,587	14,757	6,837	1,575	3,213	1,421	–	101,162
Net book value at 30 June 2012	**12,450**	**30,181**	**–**	**17,948**	**7,725**	**816**	**154**	**448**	**448**	**–**	**70,170**

The opening net book value for the Group at 1 July 2011 was $107,171k. The opening net book value for the Parent at 1 July 2011 was $71,361k.

During the year ended 30 June 2012, the useful life of scientific equipment, motor vehicles and small boats was reassessed to reflect management's estimation of useful life. The useful life of scientific equipment increased from 4 to 8 years, motor vehicles increased from 4 to 6 years, and small boats increased from 5 to 10 years. Depreciation expense decreased by $3,319k for the Group and $3,257k for the Parent. There has been no change to the estimated useful lives in the year ended 30 June 2013.

Assumptions underlying the estimated useful lives of assets include timing of technological obsolescence and future utilisation plans.

16. Heritage assets

NIWA has one collection and three databases that have been defined as heritage assets. Heritage collection assets are those assets held for the duration of their physical lives because of their unique scientific importance, and heritage databases are maintained as an incidental part of existing business operations.

NIWA has the following heritage assets:

Type	Description
Marine Benthic Biology Collection	A national reference collection of marine invertebrates.
National Climate Database	A national electronic database of high-quality climate information, including temperatures, rainfall, wind and other climate elements.
Water Resources Archive Database	A national electronic database of river and lake locations throughout New Zealand, including levels, quality and flows.
New Zealand Freshwater Fish Database	A national electronic database of the occurrence of fish in the freshwaters of New Zealand, including major offshore islands.

The nature of these heritage assets, and their significance to the science NIWA undertakes, make it necessary to disclose them. In the Directors' view the cost of these heritage assets cannot be assessed with any reliability, and accordingly these assets have not been recognised for reporting purposes.

17. Identifiable intangibles

Group

in thousands of New Zealand dollars	Software	Copyrights	Total
Cost			
Balance as at 1 July 2012	7,023	215	7,238
Additions	336	–	336
Disposals	(463)	–	(463)
Balance as at 30 June 2013	6,896	215	7,111
Accumulated amortisation and impairment losses			
Balance as at 1 July 2012	6,606	215	6,821
Amortisation	205	–	205
Disposals	(463)	–	(463)
Balance as at 30 June 2013	6,348	215	6,563
Net book value at 30 June 2013	**548**	**–**	**548**

Group

in thousands of New Zealand dollars	Software	Copyrights	Total
Cost			
Balance as at 1 July 2011	6,602	215	6,817
Additions	497	–	497
Disposals	(76)	–	(76)
Balance as at 30 June 2012	7,023	215	7,238
Accumulated amortisation and impairment losses			
Balance as at 1 July 2011	6,602	215	6,817
Amortisation	82	–	82
Disposals	(78)	–	(78)
Balance as at 30 June 2012	6,606	215	6,821
Net book value at 30 June 2012	**417**	**–**	**417**

The opening net book value at 1 July 2011 was Nil.

17. Identifiable intangibles *(continued)*

Parent

in thousands of New Zealand dollars	Software	Copyrights	Total
Cost			
Balance as at 1 July 2012	6,647	–	6,647
Additions	331	–	331
Disposals	(459)	–	(459)
Balance as at 30 June 2013	6,519	–	6,519
Accumulated amortisation and impairment losses			
Balance as at 1 July 2012	6,263	–	6,263
Amortisation	192	–	192
Disposals	(459)	–	(459)
Balance as at 30 June 2013	5,996	–	5,996
Net book value at 30 June 2013	**523**	**–**	**523**

Parent

in thousands of New Zealand dollars	Software	Copyrights	Total
Cost			
Balance as at 1 July 2011	6,215	–	6,215
Additions	463	–	463
Disposals	(31)	–	(31)
Balance as at 30 June 2012	6,647	–	6,647
Accumulated amortisation and impairment losses			
Balance as at 1 July 2011	6,215	–	6,215
Amortisation	81	–	81
Disposals	(33)	–	(33)
Balance as at 30 June 2012	6,263	–	6,263
Net book value at 30 June 2012	**384**	**–**	**384**

The opening net book value at 1 July 2011 was Nil.

There has been no change to the estimated useful lives in the year ended 30 June 2013.

During the year ended 30 June 2012 the useful life of software was reassessed to reflect management's estimation of useful life. The useful life of software increased from 1 to 3 years.

18. Investments

in thousands of New Zealand dollars	Parent 2013	Parent 2012
Investments in subsidiaries	12,709	12,709
	12,709	**12,709**

Investments in subsidiaries

Name	Principal activities	Ownership and voting interest	
		2013 %	2012 %
NIWA Vessel Management Ltd	Vessel charters for scientific research	100	100
NIWA Australia Pty Ltd	Scientific research and consultancy services	100	100
NIWA Environmental Research Institute	Scientific research and consultancy services	100	100
Unidata Pty Ltd	Supplier of environmental technology products	80	80
NIWA Natural Solutions Ltd	Non-trading shell company	100	100
EcoConnect Ltd	Non-trading shell company	100	100

All subsidiaries have a balance date of 30 June.

NIWA Vessel Management Ltd, NIWA Natural Solutions Ltd, and EcoConnect Ltd are incorporated in New Zealand. NIWA Australia Pty Ltd and Unidata Pty Ltd are incorporated in Australia. NIWA Environmental Research Institute is incorporated in the USA.

19. Receivables

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Trade receivables	18,258	18,194	17,900	16,675
Sundry receivables	4	375	31	372
Provision for doubtful debts	(1)	(438)	(1)	(438)
Total	**18,261**	**18,131**	**17,930**	**16,609**
Classified as:				
Non-current	238	187	238	187
Current	18,023	17,944	17,692	16,422
	18,261	**18,131**	**17,930**	**16,609**

Included in the Group and the Parent's trade receivables balance at the end of the year is one debtor's balance which equates to 40 per cent for the Group and Parent's total trade receivables balance (2012: Group 38 per cent and Parent 42 per cent). Contracts with a Crown-owned debtor specify retentions are held on each invoice until the individual contracts are complete, which can take up to 5 years. The non-current component of receivables relates to the long-term portion of these contract retentions.

A large proportion of the Group's commercial customers are from central government, local government, and private sectors which the Group considers to be low credit risk.

Before accepting a new customer, a credit check is undertaken when deemed appropriate to ensure validity of the customer before any service or goods are provided to the customer.

The Group reserves the right to charge interest at a rate of 2 per cent per month, calculated daily, on all invoices remaining unpaid at the due date.

19. Receivables *(continued)*

Past due but not impaired trade receivables

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Between 60 and 90 days	121	129	111	129
Between 91 and 180 days	14	83	14	69
Over 181 days	13	1,168	13	284
	148	**1,380**	**138**	**482**

Included in the Group's trade receivable balance are debtors with a carrying amount of $148k (2012: $1,380k) which are past due at the reporting date for which the Group has not provided as the amounts are still considered recoverable. The Group does not hold any collateral over past due or impaired balances.

Included in the Parent's trade receivable balance are debtors with a carrying amount of $138k (2012: $482k) which are past due at the reporting date for which the Parent has not provided as the amounts are still considered recoverable. The Parent does not hold any collateral over past due or impaired balances.

The balances above exclude the Crown-owned debtor who has a significant amount owing to the Group as indicated above for which management consider there is low credit risk.

Provision for doubtful debts

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Balance at the beginning of the year	438	398	438	398
Impairment loss recognised	1	41	1	41
Impairment losses reversed	(42)	(1)	(42)	(1)
Amounts written off as uncollectible	(355)	–	(355)	–
Amounts recovered during the year	(41)	–	(41)	–
	1	**438**	**1**	**438**

Included in the provision for doubtful debts are individually selected debtors of $1k (2012: $398k) for the Group and the Parent which are unlikely to be recoverable. The provision recognises the difference between the carrying amount of these trade receivables and the expected recoverable amount. The net carrying amount is considered to approximate their fair value.

20. Uninvoiced receivables

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Uninvoiced receivables	5,064	3,989	4,569	3,979

The amount of revenue unbilled at balance date is represented by 'uninvoiced receivables', which are stated at the proportion to the stage of completion in the statement of financial position. Once this balance is invoiced it is transferred to trade debtors.

Management believe there are no significant concentrations of risk relating to this balance.

21. Inventory

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Consumables	1,011	1,091	157	109
Finished goods	1,415	1,761	1,034	1,376
Work in progress	–	184	–	184
Total	**2,426**	**3,036**	**1,191**	**1,669**

Inventories are not pledged as security for liabilities, nor are any inventories subject to retention of title clauses.

22. Reconciliation of the profit for the period to net cash from operating activities

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Profit for the period	**4,640**	**5,541**	**3,003**	**3,520**
Add/(less) items classified as investing activities				
Net loss/(gain) on disposal of property, plant and equipment	(82)	236	(103)	207
	(82)	**236**	**(103)**	**207**
Add/(less) non-cash items				
Depreciation and impairment	11,882	10,994	8,516	8,026
Amortisation of identifiable intangibles	205	82	192	81
(Increase)/decrease in unsecured loan	(15)	(36)	–	–
Net foreign currency (gain)/loss	171	88	20	(5)
Increase/(decrease) in deferred tax liability	1,147	490	613	618
	13,390	**11,617**	**9,341**	**8,719**
Add/(less) movements in working capital items				
Increase/(decrease) in payables and accruals and revenue in advance	3,242	(4,461)	3,114	(1,671)
Increase/(decrease) in employee entitlements	(383)	374	(531)	129
(Increase)/decrease in receivables and prepayments	(414)	1,954	(1,589)	1,798
(Increase)/decrease in inventory and uninvoiced receivables	(465)	707	(112)	908
(Increase)/decrease in taxation receivable	410	1,114	500	444
Increase/(decrease) in forward exchange derivatives	–	(20)	–	(20)
	2,390	**(332)**	**1,382**	**1,588**
Net cash flows from operating activities	**20,338**	**17,062**	**13,623**	**14,034**

23. Related party transactions

In addition to the disclosures in note 19, the Government of New Zealand (the Crown) is the ultimate shareholder of the NIWA Group. All transactions with other government-owned entities do not fall within the scope of related party transactions. No related party debts have been written off or forgiven during the year. Any business the NIWA Group has transacted in which a Director or an employee has an interest has been carried out on a commercial 'arms-length' basis. Any potential conflict is recorded and minuted in Board meetings for Directors and a separate interest register for employees. The interest register containing all relevant interests is updated on a regular and timely basis.

Key management personnel compensation

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Short-term benefits	6,243	6,579	6,039	6,417

The table above includes remuneration of the Chief Executive and all key management positions.

24. Financial instruments

Capital management

The Group has externally imposed requirements under the Crown Research Institutes Act 1992:

- to operate in a financially-responsible manner so that sufficient operating funds are generated to maintain financial viability;
- to provide an adequate rate of return on shareholders' funds; and
- to operate as a going concern.

The Group's policy is to maintain a strong capital base so as to maintain investor and creditor confidence and to sustain future development of the business.

The Group's policies in respect of capital management and allocation are reviewed regularly by the Board of Directors.

The advance facility available from The ANZ National Bank is subject to two covenants:

1. Maintain shareholders' funds of not less than $50 million of net tangible assets; and
2. Reserve the right to review the facility in the event of a change in the shareholding structure.

Capital refers to the equity and borrowings of the Group and Parent.

There have been no material changes in the Group's management of capital during the period.

Fair value of financial instruments

The fair values of financial assets and financial liabilities are determined as follows:

1. The fair value of financial assets and financial liabilities with standard terms and conditions and traded on active liquid markets is determined with reference to quoted market prices;
2. The fair value of other financial assets and financial liabilities (excluding derivative instruments) is determined in accordance with valuation techniques based on discounted cash flow analysis using prices from observable recent market transactions, or dealer quotes for similar instruments; and
3. The fair value of derivative instruments is calculated using quoted prices. Where such prices are not available, use is made of discounted cash flow analysis using the applicable yield curve for the duration of the instruments for non-optional derivatives, and option pricing models for optional derivatives.

The Group has no level 3 financial instruments. The carrying value of all financial instruments is considered to approximate fair value.

24. Financial instruments *(continued)*

Categories of financial instruments

Group

in thousands of New Zealand dollars Balance at 30 June 2013	Note	Loans and receivables	Financial liabilities at amortised cost	Total
Assets				
Cash and cash equivalents		4,272	–	
Receivables	19	18,261	–	
Uninvoiced receivables	20	5,064	–	
Total financial assets		27,597	–	27,597
Total non-financial assets				108,086
Total assets				**135,683**
Liabilities				
Payables and accruals	12	–	17,694	
Unsecured loans	9	–	395	
Employee entitlements	10	–	9,345	
Total financial liabilities		–	27,434	27,434
Total non-financial liabilities				7,813
Total liabilities				**35,247**

Fair value through profit or loss financial instruments are all level 2 of the hierarchy.

in thousands of New Zealand dollars Balance at 30 June 2012	Note	Loans and receivables	Financial liabilities at amortised cost	Total
Assets				
Cash and cash equivalents		2,781	–	
Receivables	19	18,131	–	
Uninvoiced receivables	20	3,989	–	
Total financial assets		24,901	–	24,901
Total non-financial assets				109,584
Total assets				**134,485**
Liabilities				
Payables and accruals	12	–	14,452	
Unsecured loans	9	–	380	
Borrowings	13	–	7,500	
Employee entitlements	10	–	9,728	
Total financial liabilities		–	32,060	32,060
Total non-financial liabilities				6,666
Total liabilities				**38,726**

for the year ended 30 June 2013

24. Financial instruments *(continued)*

Parent

in thousands of New Zealand dollars Balance at 30 June 2013	Note	Loans and receivables	Financial liabilities at amortised cost	Investment in subsidiary accounted for at cost	Total
Assets					
Cash and cash equivalents		2,937	–	–	
Receivables	19	17,930	–	–	
Investments	18	–	–	12,709	
Uninvoiced receivables	20	4,569	–	–	
Intercompany	14	1,526	–	–	
Total financial assets		26,962	–	12,709	39,671
Total non-financial assets					75,235
Total assets					**114,906**
Liabilities					
Payables and accruals	12	–	16,325	–	
Employee entitlements	10	–	8,139	–	
Total financial liabilities		–	24,464	–	24,464
Total non-financial liabilities					6,067
Total liabilities					**30,531**

in thousands of New Zealand dollars Balance at 30 June 2012	Note	Loans and receivables	Financial liabilities at amortised cost	Investment in subsidiary accounted for at cost	Total
Assets					
Cash and cash equivalents		1,719	–	–	
Receivables	19	16,609	–	–	
Investments	18	–	–	12,709	
Uninvoiced receivables	20	3,979	–	–	
Intercompany	14	6,736	–	–	
Total financial assets		29,043	–	12,709	41,752
Total non-financial assets					74,140
Total assets					**115,892**
Payables and accruals	12	–	13,211	–	
Borrowings	13	–	7,500	–	
Intercompany	14	–	2	–	
Employee entitlements	10	–	8,670	–	
Total financial liabilities		–	29,383	–	29,383
Total non-financial liabilities					5,137
Total liabilities					**34,520**

24. Financial instruments *(continued)*

Credit risk

Credit risk is the risk that a third party will default on its obligations to NIWA and the Group, causing a loss.

In the normal course of business, the Group incurs credit risk from trade receivables, uninvoiced receivables and transactions with financial institutions (cash and short-term deposits and derivatives).

The Group has a credit policy that is used to manage this risk. As part of this policy, limits are placed on the amounts of credit extended to third parties, and care is taken to ensure the credit-worthiness of third parties dealt with. All credit-risk exposures are monitored regularly.

The Group does not require any collateral or security to support financial instruments, because of the quality of financial institutions and counterparties dealt with. There are no significant concentrations of credit risk.

The maximum exposure to credit risk for the Group is $27,594k (total exposed to credit risk, which is cash and cash equivalents $4,272k, uninvoiced receivables $5,064k, and trade receivables net of provisions $18,258k) (2012: $24,901k).

The maximum exposure to credit risk for the Parent is $26,962k (total exposed to credit risk, which is cash and cash equivalents $2,937k, uninvoiced receivables $4,569k, trade receivables net of provisions $17,930k, and intercompany $1,526k) (2012: $29,043k).

Receivables and prepayments include further analysis on the trade receivables (refer note 19).

The Group has not renegotiated the terms of any financial assets which would result in the carrying amount no longer being past due or avoid a possible past due status.

The Group's maximum exposure to credit risk by geographic region is as follows:

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
New Zealand	24,229	22,922	25,690	28,757
Australia	1,907	1,774	478	481
USA	714	213	155	65
United Kingdom	20	3	20	3
Other Asia-Pacific countries	663	144	558	144
Other regions	62	283	62	31
Provision for doubtful debts	(1)	(438)	(1)	(438)
Total credit risk	**27,594**	**24,901**	**26,962**	**29,043**

Interest-rate risk

Interest-rate risk is the risk that cash flows will fluctuate because of changes in market interest rates. This could particularly affect the cost of borrowing and the return on investments.

The interest-rates on the Group and Parent borrowings as at 30 June:

	2013	2012
Borrowings	4.05%	3.61% – 3.65%

The interest-rates on the Group and Parent investments as at 30 June:

	2013	2012
Cash (on call)	2.5%	2.5%

The Directors do not consider there is any significant exposure to interest-rate risk.

All borrowings and intercompany balances are managed by NIWA on behalf of the Group.

NIWA has a regularly reviewed treasury policy in place which ensures the appropriate management of currency and interest-rate risk.

24. Financial instruments *(continued)*

Currency risk

The Group undertakes transactions in foreign currencies from time to time, and, resulting from these activities, exposures in foreign currency arise. It is the Group's policy to hedge foreign currency trading transaction risks economically as they arise. To manage these exposures, the Group may use financial instruments such as forward foreign exchange contracts. At balance date, the Group had forward foreign exchange arrangements in place with a New Zealand dollar (NZD) notional value of Nil (2012: Nil).

The following table details the performance guarantee outstanding as at 30 June 2013 for the Parent and the Group.

	Average exchange rates		Foreign currency		Notional value		Fair value	
in thousands of New Zealand dollars	2013	2012	2013	2012	2013	2012	2013	2012
USD								
3 to 6 months	0.8203	–	6	–	8	–	–	–

The Group's exposure to foreign currency denominated non-derivative financial instruments was as follows, based on notional amounts:

in thousands of New Zealand dollars	AUD	EUR	USD	SGD	AUD	EUR	USD	SGD
	30 June 2013				30 June 2012			
Cash balances	1,527	2	430	1	962	2	218	1
Trade receivables	410	–	155	–	709	33	122	–
Trade payables	(216)	(18)	(70)	(54)	(161)	(59)	(91)	(69)
Statement of financial position exposure	**1,721**	**(16)**	**515**	**(53)**	**1,510**	**(24)**	**249**	**(68)**

The Parent's exposure to foreign currency denominated non-derivative financial instruments (excluding derivatives) was as follows, based on notional amounts:

in thousands	AUD	EUR	USD	SGD	AUD	EUR	USD	SGD
	30 June 2013				30 June 2012			
Cash balances	359	2	396	1	1	2	125	1
Trade receivables	14	–	155	–	73	33	78	–
Trade payables	(163)	(18)	(65)	–	(91)	(52)	(71)	–
Statement of financial position exposure	**210**	**(16)**	**486**	**1**	**(17)**	**(17)**	**132**	**1**

The following significant exchange rates applied:

NZD	Reporting date spot rate	
	2013	2012
AUD	0.8423	0.7830
USD	0.7803	0.7946
NOK	4.7099	4.7712
SGD	0.9862	1.0112
EUR	0.5971	0.6319
YEN	77.14	63.01

24. Financial instruments *(continued)*

A 10 per cent strengthening of the NZD against the following currencies at 30 June 2013 would have increased (decreased) the profit and the equity by the amounts shown below. This analysis assumes that all other variables, in particular interest rates, remain constant. The analysis is performed on the same basis for 2012.

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
AUD	(191)	(168)	(23)	2
EUR	2	3	2	2
USD	(57)	(28)	(54)	(12)
YEN	–	–	–	–
NOK	–	8	–	–
SGD	6	1	–	1

A 10 per cent weakening of the NZD against the above currencies at 30 June 2013 would have had approximately an equal but opposite effect on the above currencies to the amounts shown above, on the basis that all other variables remain constant.

Liquidity risks

Liquidity risk represents the Group's ability to meet its contractual obligations. The Group evaluates its liquidity requirements on an ongoing basis. In general, the Group generates sufficient cash flows from its operating activities to meet its obligations arising from its financial liabilities and has credit lines in place to cover potential shortfalls.

The NIWA Group's current assets exceed its current liabilities by $4.969 million in 2013. In 2012 the current liabilities exceeded its current assets by $1.034 million due to the decision to secure borrowings on a short-term basis which had favourable terms and interest rates in comparison with long-term debt. This was not drawn down at 30 June 2013. NIWA is able to meet all of its obligations as they fall due.

The following table details the Group's and the Parent's contractual maturity analysis. The table has been based upon the earliest date on which the Group and the Parent can be required to pay.

Group

in thousands of New Zealand dollars As at 30 June 2013	On demand	Less than 1 year	Later than 1 year and not later than 5 years	Later than 5 years	Total
Payables and accruals	–	13,327	–	–	13,327
Unsecured loan	–	395	–	–	395
Employee entitlements	–	8,857	488	–	9,345
Total	**–**	**22,579**	**488**	**–**	**23,067**

in thousands of New Zealand dollars As at 30 June 2012	On demand	Less than 1 year	Later than 1 year and not later than 5 years	Later than 5 years	Total
Payables and accruals	–	10,454	–	–	10,454
Unsecured loan	–	19	457	–	476
Borrowings	–	7,500	–	–	7,500
Employee entitlements	–	9,104	624	–	9,728
Total	**–**	**27,077**	**1,081**	**–**	**28,158**

24. Financial instruments *(continued)*

Parent

in thousands of New Zealand dollars As at 30 June 2013	On demand	Less than 1 year	Later than 1 year and not later than 5 years	Later than 5 years	Total
Payables and accruals	–	11,969	–	–	11,969
Employee entitlements	–	7,767	372	–	8,139
Total	**–**	**19,736**	**372**	**–**	**20,108**

in thousands of New Zealand dollars As at 30 June 2012	On demand	Less than 1 year	Later than 1 year and not later than 5 years	Later than 5 years	Total
Payables and accruals	–	9,213	–	–	9,213
Intercompany	–	2	–	–	2
Borrowings	–	7,500	–	–	7,500
Employee entitlements	–	8,153	517	–	8,670
Total	**–**	**24,868**	**517**	**–**	**25,385**

Financing facilities

The Group has access to financing facilities; the total facility is $10.5 million (2012: $19.5 million). This was undrawn at 30 June 2013 (2012: $7.5 million). The total facility of $10.5 million relates to an overdraft facility of $0.5 million (on-call) and an overnight placement and short-term advance facility of $10 million (2012: $19.0 million). These facilities are available for the Parent company.

25. Commitments

Operating lease arrangements

in thousands of New Zealand dollars	Group 2013	Group 2012	Parent 2013	Parent 2012
Obligations payable after balance date on non-cancellable operating leases:				
Within 1 year	2,615	2,576	2,534	2,489
Between 1 and 2 years	2,123	2,053	2,123	2,053
Between 2 and 5 years	5,549	5,521	5,549	5,521
Over 5 years	6,850	8,447	6,850	8,447
	17,137	**18,597**	**17,056**	**18,510**

Operating leases relate to office and laboratory facilities within New Zealand and Australia with lease terms between 1 and 11 years, with various options to extend.

Capital commitments

There are no capital commitments (2012: Nil).

26. Contingent liabilities

There are no material contingent liabilities (2012: Nil).

27. Subsequent events

A dividend of $2 million was declared by the Board of Directors on 19 August 2013.

Directors' remuneration

Directors' remuneration received or due and receivable during the year is:

in thousands of New Zealand dollars	2013	2012
Directors of the National Institute of Water & Atmospheric Research Ltd		
Chris Mace *(Chairman)*	72	72
Craig Ellison *(Deputy Chairman)*	45	45
Dr Helen Anderson	36	36
Prof. Keith Hunter	36	–
Ed Johnson	36	36
Helen Robinson	36	36
Jason Shoebridge	36	36
Dr Wendy Lawson	–	36

No fees were paid in respect of Directors of the subsidiaries NIWA Vessel Management Ltd, NIWA Environmental Research Institute, NIWA Australia Pty Ltd, NIWA Natural Solutions Ltd, EcoConnect Ltd, and Unidata Pty Ltd, other than those shown above.

Directors' insurance

The NIWA Group has arranged policies for Directors' liability insurance which, with a deed of indemnity, ensures that generally Directors will incur no monetary loss as a result of lawful actions undertaken by them as Directors. Certain actions are specifically excluded; for example, incurring penalties and fines which may be imposed in respect of breaches of the law.

Employees' remuneration

The numbers of employees (not including Directors) whose total remuneration exceeded $100,000 are:

Group

	2013	2012
100,000–109,999	42	41
110,000–119,999	32	25
120,000–129,999*	23	23
130,000–139,999*	14	10
140,000–149,999*	6	7
150,000–159,999	10	6
160,000–169,999*	7	7
170,000–179,999*	6	3
180,000–189,999	4	2
190,000–199,999	2	2
200,000–209,999	3	3
210,000–219,999	1	2
240,000–249,999	–	1
260,000–269,000	1	1
280,000–289,999	2	2
560,000–569,999**	–	1
570,000–579,999**	1	–

* In 2012–13, the Parent and Group paid compensation or other benefits to 22 people who ceased to be an employee during the financial year. The total value of the payment was $993,184 (2011-12: $571,830). Of these 22 people, 7 are included in the table above.

** Chief Executive's remuneration band (varies based on at-risk salary component).

Remuneration includes salary, accrued at-risk salary components, severance, and exit payments.

Remuneration exceeding $100,000 was received by 91 science staff, 14 science support, 30 management, and 19 subsidiaries. (2012: 92 science staff, 11 science support, 19 management, and 15 subsidiaries).

Donations

Donations of $8,313 were made during the year (2012: $3,968).

Dividends

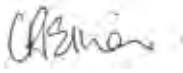
No dividend payments (2012: Nil) were made to the Government of New Zealand as the sole shareholder. A dividend of $2 million was declared by the Board of Directors on 19 August 2013.

STATEMENT OF RESPONSIBILITY

The following statement is made in accordance with section 155 of the Crown Entities Act 2004.

1. The Board of the company is responsible for the preparation of these financial statements and the judgements used therein.
2. The Board of the company is responsible for establishing and maintaining a system of internal controls designed to provide reasonable assurance as to the integrity and reliability of financial reporting.
3. In the opinion of the Board, these financial statements reflect a true and fair view of the financial position and operations of the National Institute of Water & Atmospheric Research Ltd and Group for the year ended 30 June 2013.

Chris Mace
Chairman



Craig Ellison
Director

19 August 2013

Deloitte.

INDEPENDENT AUDITOR'S REPORT

TO THE READERS OF NATIONAL INSTITUTE OF WATER AND ATMOSPHERIC RESEARCH LIMITED AND GROUP'S FINANCIAL STATEMENTS FOR THE YEAR ENDED 30 JUNE 2013

The Auditor-General is the auditor of National Institute of Water and Atmospheric Research Limited (the company and group). The Auditor-General has appointed me, Andrew Dick, using the staff and resources of Deloitte, to carry out the audit of the financial statements of the company and group, on her behalf.

We have audited the financial statements of the company and group on pages 79 to 109, that comprise the statement of financial position as at 30 June 2013, the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year ended on that date and the notes to the financial statements that include accounting policies and other explanatory information.

Opinion

Financial statements

In our opinion the financial statements of the company and group on pages 79 to 109:

- comply with generally accepted accounting practice in New Zealand;
- comply with International Financial Reporting Standards; and
- give a true and fair view of the company and group's:
  - financial position as at 30 June 2013; and
  - financial performance and cash flows for the year ended on that date.

Other legal requirements

In accordance with the Financial Reporting Act 1993 we report that, in our opinion, proper accounting records have been kept by the company as far as appears from an examination of those records.

Our audit was completed on 19 August 2013. This is the date at which our opinion is expressed.

The basis of our opinion is explained below. In addition, we outline the responsibilities of the Board of Directors and our responsibilities, and we explain our independence.

Basis of opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the International Standards on Auditing (New Zealand). Those standards require that we comply with ethical requirements and plan and carry out our audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

Material misstatements are differences or omissions of amounts and disclosures that in our judgement, are likely to influence readers' overall understanding of the financial statements. If we had found material misstatements that were not corrected, we would have referred to them in our opinion.

An audit involves carrying out procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on our judgement, including our assessment of risks of material misstatement of the financial statements whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the company and group's preparation of the financial statements that fairly reflect the matters to which they relate. We consider internal control in order to design audit procedures that are appropriate in the circumstances but not for the purpose of expressing an opinion on the effectiveness of the company and group's internal control.

An audit also involves evaluating:

- the appropriateness of accounting policies used and whether they have been consistently applied;
- the reasonableness of the significant accounting estimates and judgements made by the Board of Directors;
- the adequacy of all disclosures in the financial statements; and
- the overall presentation of the financial statements.

We did not examine every transaction, nor do we guarantee complete accuracy of the financial statements. Also we did not evaluate the security and controls over the electronic publication of the financial statements.

In accordance with the Financial Reporting Act 1993, we report that we have obtained all the information and explanations we have required. We believe we have obtained sufficient and appropriate audit evidence to provide a basis for our audit opinion.

Responsibilities of the Board of Directors

The Board of Directors is responsible for preparing financial statements that:

- comply with generally accepted accounting practice in New Zealand; and
- give a true and fair view of the company and group's financial position, financial performance and cash flows.

The Board of Directors is also responsible for such internal control as it determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error. The Board of Directors is also responsible for the publication of the financial statements, whether in printed or electronic form.

The Board of Directors' responsibilities arise from the Crown Research Institutes Act 1992 and the Financial Reporting Act 1993.

Responsibilities of the Auditor

We are responsible for expressing an independent opinion on the financial statements and reporting that opinion to you based on our audit. Our responsibility arises from section 15 of the Public Audit Act 2001 and the Crown Research Institutes Act 1992.

Independence

When carrying out the audit, we followed the independence requirements of the Auditor-General, which incorporate the independence requirements of the External Reporting Board.

Other than the audit, we have no relationship with or interests in the company or any of its subsidiaries.

Andrew Dick, **Deloitte**
On behalf of the Auditor-General, Auckland, New Zealand

Matters relating to the electronic presentation of the audited financial statements

This audit report relates to the financial statements of National Institute of Water and Atmospheric Research Limited (the company) and group for the year ended 30 June 2013 included on the company's website. The company's Board of Directors is responsible for the maintenance and integrity of the company's website. We have not been engaged to report on the integrity of the company's website. We accept no responsibility for any changes that may have occurred to the financial statements since they were initially presented on the website.

The audit report refers only to the financial statements named above. It does not provide an opinion on any other information which may have been hyperlinked to or from the financial statements. If readers of this report are concerned with the inherent risks arising from electronic data communication they should refer to the published hard copy of the audited financial statements and related audit report dated 19 August 2013 to confirm the information included in the audited financial statements presented on this website.

Legislation in New Zealand governing the preparation and dissemination of financial information may differ from legislation in other jurisdictions.

Dr Joshu Mountjoy (left) and Suzanne Woelz bring in the applied acoustics boomer and hydrophone after a day's operation just south of Kaikoura, on board RV Ikatere. *The boomer is used for looking at different substrates beneath the seafloor, to help determine the risk of an underwater landslide which could generate a tsunami.*

Dave Allen

DIRECTORY

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Craig Ellison (Deputy Chairman)

Dr Helen Anderson

Prof. Keith Hunter

Ed Johnson

Helen Robinson

Jason Shoebridge

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TAIHORO NUKURANGI

NIWA's Māori name Taihoro Nukurangi describes our work as studying the waterways and the interface between the Earth and the sky. Taihoro is the flow and movement of water (from tai 'coast, tide' and horo which means 'fast moving'). Nukurangi is the interface between the sea and the sky (i.e., the atmosphere). Together, we have taken it to mean 'where the waters meet the sky'.

Dave Allen

NIWA
Taihoro Nukurangi