

# NIWA

Enhancing the benefits of  
New Zealand's natural resources

STATEMENT OF  
CORPORATE INTENT  
2013/14



JUNE 2013

# Q

**How are NIWA forecasts helping New Zealanders in their lives and businesses?**

**A:** NIWA's weather and natural hazards forecasting is backed by the national climate network, NIWA science, international research partnerships, and our supercomputer – one of the most powerful of its kind in the Southern Hemisphere. Daily forecasts for 48 urban areas are available to the public via our weather website – [www.niwaweather.co.nz](http://www.niwaweather.co.nz). Our new web-based subscription weather forecasting and information service, called NIWA forecast, helps New Zealand farmers and growers identify windows of opportunity to carry out weather-dependent operations such as fertilising, spraying and harvesting. NIWA's forecast resolution is 12km – meaning our forecasts have greater accuracy and relevance for individual farmers.



**COVER IMAGE**

*Dr Murray Poulter, NIWA's Chief Scientist of Atmosphere and Natural Hazards oversees the launch of NIWA forecast and NIWA weather.*

**IMAGE:** *Dave Allen*

# Q

How is NIWA helping to develop a National Ocean 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.

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## NIWA Statement of Corporate Intent 2013/14

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## INTRODUCTION

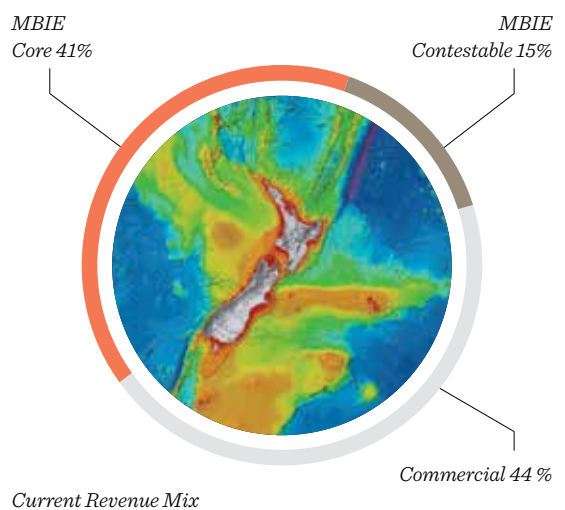
The National Institute of Water and Atmospheric Research Ltd (NIWA) is a Crown Research Institute incorporated as a company on 1 July 1992. Ownership is held equally between two shareholding Ministers appointed by the New Zealand Government with governance by a Crown-appointed Board of Directors.

The Shareholders' expectations of NIWA are contained in the Statement of Core Purpose (see page 4) that defines our purpose, expected outcomes, scope of operation, and operating principles. This Statement of Corporate Intent (SCI) sets out NIWA's strategy for delivering against this core purpose over the next five years. The SCI is reviewable annually.

NIWA is New Zealand's leading provider of atmospheric, freshwater and marine research and associated services. NIWA currently employs 600 staff spread across 15 locations (with major sites located at Auckland, Hamilton, Wellington and Christchurch), has assets of \$130M and annual revenues of approximately \$120M. Revenue comprises Core Funding and contestable science funding from the Ministry of Business, Innovation & Employment, and commercial revenue received through the provision of applied science services to a diverse array of clients (central, regional and local government agencies, State-owned enterprises and the private sector). Among NIWA's science assets are several of national significance, including research vessels, a high-performance computer, a large-scale aquaculture facility, environmental databases, and biological collections.

NIWA's skills and assets are deployed to conduct science that supports New Zealand's economic growth, enhances human well-being and safety, and enables stewardship of the country's natural resources and biodiversity. These benefits are achieved through an organisational focus on quality science that is relevant to stakeholder needs. NIWA takes a leadership position in those areas of science identified in our Statement of Core Purpose. We collaborate with others nationally and internationally to ensure 'best teams' in our core science areas and join teams led by others where our skills can contribute.

Strategic partnerships with stakeholders ensure both the relevance of NIWA's science programmes and the use of knowledge-transfer mechanisms that will encourage uptake. Further strengthening of these relationships will provide further national benefit, particularly where it is directed towards sectors that manage or utilise natural resources or are weather-dependent.



## Our Purpose

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

### Outcomes

NIWA will fulfil its purpose through the provision of research and transfer of technology and knowledge in partnership with key stakeholders including industry, government and Māori to:

- ▶ increase economic growth through the sustainable management and use of aquatic resources
- ▶ grow renewable energy production through developing a greater understanding of renewable aquatic and atmospheric energy resources
- ▶ increase the resilience of New Zealand and South-West Pacific islands to tsunami and weather and climate hazards, including drought, floods and sea-level change
- ▶ 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
- ▶ enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity
- ▶ increase understanding of the Antarctic and Southern Ocean climate, cryosphere, oceans and ecosystems and their longer-term impact on New Zealand.

### Scope of Operation

To achieve these outcomes, NIWA is the lead CRI in the following areas:

- ▶ aquatic resources and environments (with a focus on surface freshwaters and coastal environments)
- ▶ oceans
- ▶ freshwater and marine fisheries
- ▶ aquaculture
- ▶ climate and atmosphere
- ▶ climate and weather hazards
- ▶ aquatic and atmospheric-based energy resources
- ▶ aquatic biodiversity (including biosystematics) and biosecurity.

NIWA will work with other research providers and end users to contribute to the development of the following areas:

- ▶ biosecurity, freshwater and hazards management
- ▶ climate change adaptation and mitigation
- ▶ ocean floor exploration
- ▶ seafood sector
- ▶ urban environments
- ▶ Antarctica.

## Operating Principles

NIWA will:

- ▶ operate in accordance with a Statement of Corporate Intent and business plan that describes how NIWA will deliver against this Statement of Core Purpose, and describes what the shareholders will receive for their investment
- ▶ meet its obligations as a Crown Company and remain financially viable, delivering an appropriate rate of return on equity
- ▶ develop strong, long-term partnerships with key stakeholders, including industry, government and Māori, and work with them to set research priorities that are well linked to the needs and potential of its end users
- ▶ maintain a balance of research that provides for both the near-term requirements of its sectors and demonstrates vision for their longer-term benefit
- ▶ transfer technology and knowledge from domestic and international sources to key New Zealand stakeholders, including industry, government and Māori
- ▶ develop collaborative relationships with other CRIs, universities and other research institutions (within New Zealand and internationally) to form the best teams to deliver its core purpose
- ▶ provide advice on matters of its expertise to the Crown
- ▶ represent New Zealand's interests on behalf of the Crown through contribution to science diplomacy and international scientific issues and/or bodies as required
- ▶ seek advice from scientific and user advisory panels to help ensure the quality and relevance of its research
- ▶ establish policies, practices and culture that optimise talent recruitment and retention
- ▶ enable the innovation potential of Māori knowledge, resources and people
- ▶ maintain its databases, collections and infrastructure and manage the scientific and research data it generates in a sustainable manner, providing appropriate access and maximising the reusability of data sets
- ▶ seek shareholder consent for significant activity beyond its scope of operation.

# Q

## How does NIWA's science infrastructure support our work?

A: NIWA has a range of nationally significant science assets, which, along with the skills of our staff and our collaborators, allow us to deliver science benefits to all New Zealanders. Those assets include our supercomputer – one of the most powerful in the Southern Hemisphere – to advance climate-change modelling and weather-related hazard and energy forecasting, and our highly-sophisticated deepwater research vessel *Tangaroa*. We also have New Zealand's largest aquaculture facility at Bream Bay – helping the sector to meet its target of being a \$1 billion industry by 2025, through uptake and commercialisation of high-value finfish from NIWA's aquaculture research and development programme.





## OPERATING ENVIRONMENT

This SCI has been prepared within the context of:

- ▶ the Shareholders' expectation that investment in science must be relevant to stakeholder need and contribute to New Zealand's economic and environmental prosperity
- ▶ emerging opportunities and challenges for New Zealand's use of its natural capital which will increasingly demand the application of NIWA's science
- ▶ an evolving policy environment for areas in NIWA's scope of operation
- ▶ the constrained fiscal environment in which NIWA will operate, particularly the expenditure constraints of our key government clients.

### Enhanced Value from NIWA's Science – being Relevant to Stakeholder Need

The Government's Business Growth Agenda acknowledges that New Zealand's economic, social and environmental prosperity is based on wise use of its abundant natural resources, with the Agenda's Progress Report for Natural Resources<sup>1</sup> being clear that the quality of this natural capital must improve over time while also being utilised to sustain economic growth in key sectors. This 'green growth' will require new ways of doing things, often informed by science.

Under the framework of the Agenda several policy initiatives are being developed that influence NIWA's science directions over the coming 5 years (and beyond).

Significant among these are reforms aimed at improving freshwater management in New Zealand<sup>2</sup>, with similar work currently underway on an oceans strategy aimed at improving the utilisation and management of New Zealand's marine estate.

The contribution of science to New Zealand is being reinvigorated through the Government's National Science Challenges initiative, which has identified 10 key issues and opportunities for New Zealand that can be addressed by research and innovation<sup>3</sup>. New investment is being made available for these challenges, and they will provide a framework for guiding existing (including CRI) investments. NIWA will be responsive to the Challenges initiative as it evolves, leading in our core areas of expertise and supporting others as appropriate.

In this context, NIWA's engagement with stakeholders and end users has given clear signals of those issues that they face and where NIWA's scientific resources can be applied to add most value, specifically:

- ▶ more efficient use of freshwater and managing freshwater quality better so that primary production may increase within environmental objectives and limits (National Science Challenge: Our land and water)

- ▶ reducing business and people risks from weather-related hazards and climate change (National Science Challenge: Resilience to nature's challenges)
- ▶ meeting future energy demand through greater harnessing of renewable resources
- ▶ extracting greater value from New Zealand's seafloor resources in a manner that minimises environmental risk (National Science Challenge: Life in a changing ocean)
- ▶ improving economic returns from fisheries and aquaculture in a sustainable manner (National Science Challenge: Life in a changing ocean)
- ▶ enhancing stewardship of New Zealand's natural capital embodied in our freshwater and marine biodiversity (National Science Challenge: New Zealand's biological heritage)
- ▶ development of the Māori economy, particularly through enhancing the productive potential of Māori resource-based industries
- ▶ optimising use of natural resources through better access to environmental data and high-resolution and accurate forecasts.

This SCI describes how NIWA will meet these needs through: aligning our science skills and assets; collaborating with other science organisations, businesses and government agencies; and ensuring our operational delivery is efficient and effective.

### Constrained Fiscal Environment

The fiscal environment over the next 5 years will remain challenging and, in developing our science strategies and associated financial forecasts presented in this SCI, we have assumed the following:

- ▶ The global economic outlook is uncertain and will continue to constrain New Zealand's economic growth<sup>4</sup>
- ▶ Budgetary pressure on government agencies will remain, and this will constrain their spending on external science services and advice. This currently represents c. 30% of NIWA's revenue
- ▶ Government direct investment in science through the Ministry of Business, Innovation & Employment will not change significantly. This currently represents c. 50% of NIWA's revenue
- ▶ Private sector investment in science will show some growth in response to an improving regulatory environment for business, increased government support for industry-led innovation, and increased investment in New Zealand's primary sector.

Despite the continuing tight fiscal environment, NIWA's revenue is budgeted to increase slightly in 2013/14 and show restrained growth over the period of this SCI.

<sup>1</sup> Building Natural Resources, December 2012

<sup>2</sup> Freshwater reform 2013 and beyond, March 2013

<sup>3</sup> Selecting the National Science Challenges Cabinet Minute, CAB Min (13) 13/5A

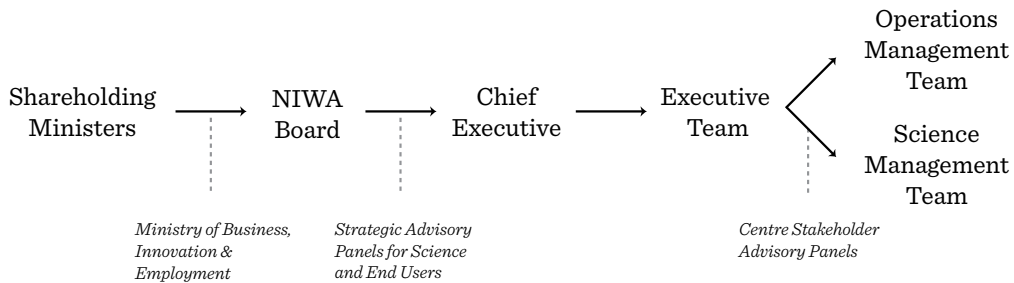
<sup>4</sup> Source: Treasury economic outlook, December 2012

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## ALIGNING THE ORGANISATION TO DELIVER ON CORE PURPOSE

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NIWA's organisational structure is shown in the diagram below



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### Key points are:

- ▶ Science and knowledge transfer strategies are driven by the Science Management Team. This team is responsible for science planning, ensuring science quality, relevance and uptake. The team is assisted by science staff and receives external advice on research directions and relevance from Centre Stakeholder Advisory Panels and through direct engagement with stakeholder organisations
- ▶ Operational delivery of the science is driven by the Operations Management Team. This team is responsible for assembling the best teams for projects and ensuring milestones are met on time and within budget
- ▶ Support functions are focused on providing cost-effective and efficient services to support delivery of our science and for ensuring compliance and reporting requirements are met
- ▶ Strategic Advisory Panels play key roles in providing independent and forward-looking advice to the NIWA Board on research strategies, user relevance and knowledge-transfer activities.

### Science Infrastructure

Much of NIWA's science is capital intensive, requiring on-going investment in equipment that enables our science strategies to be delivered. These investments also provide greater opportunities for science collaboration and enhanced benefits to our stakeholders. Key nationally significant science assets include:

- ▶ a high-performance computer to advance climate-change modelling and weather-related hazard and energy forecasting. Other New Zealand researchers are able to access the computer's capabilities through the National eScience Infrastructure (NeSI) collaborative initiative
- ▶ NIWA's highly-equipped research vessel *Tangaroa* which, along with the skills of NIWA staff and our collaborators, has the capabilities to provide key information on the resources that lie within New Zealand's Exclusive Economic Zone. The vessel is available for charter by other research organisations and industry
- ▶ the Bream Bay Aquaculture Facility which is well-equipped to be utilised by the aquaculture sector as it seeks to uptake and commercialise finfish opportunities arising from our R&D
- ▶ environmental databases that are increasingly accessible through our web portals to the general public and through specific data-transfer tools to our clients and collaborators.

This SCl assumes future capital investment at c. 10% of revenue, with this expenditure focused on new and replacement items needed to deliver on our core science programmes. We are open to participating in collaborative purchase of national science assets or to public-private partnering where these contribute to meeting the strategies outlined in this SCl and result in more efficient use of capital.

### Increased Use of Environmental Data

NIWA holds unique and nationally important environmental databases (e.g., climate, water resources) that are increasingly accessible through our web portals to the general public and through specific data-transfer tools to our clients and collaborators. NIWA continues to invest in environmental measurement networks and in developing web-based tools to improve awareness of and accessibility to the data we hold (see Environmental Information, page 52).

Data access by external users has increased nine-fold since the Environmental Information Centre was created in July 2007, with over 1.5 billion rows of data downloaded during this time. External usage of NIWA data continues to rise, with a 20% increase per year in the last two years. The expectation is that this trend will continue.

NIWA's data are used by a wide variety of end users from various sectors (e.g., energy, primary production, infrastructure, local councils, and government agencies) as an input into decision making.

We will continue to increase access to NIWA data by further investing in metadata discovery tools, and by providing clarity to users on our website with respect to free public good use and cost-recovery policies for commercial users of data (see Appendix 4: NIWA's Data Management and Access Policy).

### Better Delivery of Benefit

NIWA has a reputation for high-quality science. For this science investment to provide maximum value to New Zealand it must be delivered to stakeholders and customers in a way that encourages uptake and application. In particular, NIWA intends to continue:

- ▶ deepening its sector engagement strategy so that there is a better understanding of needs and how NIWA can add value
- ▶ ensuring a strong external awareness and customer-centric approach in everything that NIWA does
- ▶ enhancing knowledge transfer processes by improving awareness and accessibility to information and results of NIWA's Crown-funded research
- ▶ matching NIWA's science excellence with operational excellence, so that high-quality science is delivered faster, easier and with low transactional costs
- ▶ further developing staff skills in technology transfer and project management
- ▶ developing relationships with those with expertise in commercialisation, particularly Callaghan Innovation and KiwiNet
- ▶ valuing alliances with stakeholders – other science organisations, customers and end users
- ▶ developing a better framework to measure the impact of NIWA's science in collaboration with the Ministry of Business, Innovation & Employment and other CRIs
- ▶ rewarding, retaining, and recruiting those key staff with both high-end science skills and skills in applying that science to the needs and expectations of our customers.

The next two chapters – Operating with Effectiveness and Efficiency (page 11) and NIWA's Science and Knowledge Transfer (page 17) – describe how we will meet these challenges as we seek to cement our position as a high-performing organisation in all respects – conducting high quality and relevant science, delivering that science to customer expectations, and having the right people, processes and infrastructure in place.

# Q

**What makes NIWA a high-performance company?**

**A:** NIWA is committed to delivering our research and applied science services to customers in a timely, efficient and cost-effective manner. The work of our 600 science and support staff helps customers from a range of businesses – including central and local government, the fishing industry, the primary sector, exploration, transport and infrastructure – make sound decisions about their activities. Our staff are committed to operational excellence and continuous improvement. By maintaining high standards and expectations of our people, and making sure individuals are empowered and accountable for their performance, we can deliver the best work for our customers. Strong leadership and shared values are essential.

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## OPERATING WITH EFFECTIVENESS AND EFFICIENCY

As a high-performing organisation NIWA continues to review and change the way it operates to ensure delivery on its core purpose with optimal efficiency and effectiveness. Five key areas of focus have been identified:

- ▶ Being customer centric in all that NIWA does (understanding needs, ensuring delivery, strengthening relationships, building trust)
- ▶ Leadership and culture (ensuring a 'One NIWA' focus, shared understanding of NIWA's values and future, and the development of its people)
- ▶ Raising the bar (maintaining high standards and expectations, ensuring that individuals are empowered and accountable to lift their performance)
- ▶ Operational excellence (seizing opportunities to do things better, faster, easier, and cheaper, and reducing waste in all its forms)
- ▶ Continuous improvement (ensuring that continuous improvement is embedded in everything that is done, fostering innovation and continuous learning).

The following sections describe how these key focus areas are being addressed across the organisation so that people, processes and systems are best aligned to deliver on NIWA's science strategies described in NIWA's Science and Knowledge Transfer (page 17).

### Background

NIWA must deliver quality science that meets customer needs. Scientific research processes and the associated culture of deep investigation can be in tension with the requirements for delivery to customers on time, to specification and within budget. This is often exacerbated by the exploratory and complex nature of much of NIWA's work. Customer surveys show that NIWA's core science is widely considered first class (or 'world leading'), but the uptake and value of this science to NZ Inc. could be improved through enhanced customer service and experience. The following sections describe NIWA's responses to those customer surveys.

### Improving Performance

NIWA's operational strategy focuses on continuously improving science delivery, competitiveness and customer experience through better:

- ▶ project management
- ▶ customer focus
- ▶ staff focus.

All of NIWA's science is conducted using a project-based approach. NIWA's contemporary project management software has greatly improved the underlying tool for planning, conducting and monitoring the progress of projects. With this essential tool in place, it is now possible to introduce more rigorous project management approaches and accountability.

Key to enhancing uptake and application of our science is ensuring that NIWA's approach is customer centric. There is a need to further develop customer relationships skills in staff and to encourage closer relationships with customers such that they become more involved in the process of problem solving and discovery.

Increasing staff time spent on science rather than administration is a key efficiency driver. To achieve this, we will continue to streamline our administrative systems, shifting to more electronically based systems where 'write once, use many' is a key operating paradigm.

### 2013/14 Actions

To enhance customer service levels, NIWA will:

- ▶ develop and implement enhanced approaches to project risk assessment and mitigation
- ▶ enhance skills of staff in project scoping, planning and management
- ▶ improve the culture and accountability of managers for project delivery on time, to budget and to specification
- ▶ encourage an expectation across NIWA that we value our customers and will always strive to provide an outstanding customer experience.

To enhance the way we carry out our science, NIWA will:

- ▶ increase the uptake and use of desk-top, self-service, electronic systems
- ▶ continue to promote teamwork within and outside NIWA to achieve the best outcomes for our customers
- ▶ give effect to our new workforce planning process, focusing on improving the alignment between our skills and those required to deliver on our core purpose, including those priority needs identified by Government policy initiatives (e.g., National Science Challenges) and our stakeholders
- ▶ further encourage a culture of agility in adapting to change and responding to challenges and opportunities through improved mentoring and better recognition and rewards for those who are successful early adapters.

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## OUR PEOPLE

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### Background

The rapidly changing external operating environment of the last few years has also seen significant change at NIWA. All aspects of NIWA's structure and operations have been reviewed, and wide-ranging changes have been implemented to ensure that the organisation has the right capability and capacity to achieve its objectives, and that it operates as efficiently as possible.

Adapting successfully to the new environment is requiring changes in the culture and ethos of the organisation, and is demanding new skills and shifts in emphasis. Commercial acumen and customer focus are increasingly important, as is an emphasis on actively applying science to add value to customers in their problem-solving and decision-making challenges. The ability to communicate science effectively to a range of audiences is more important than ever before.

NIWA revisited and refreshed its core values during the 2012/13 year to clearly align the values of the organisation with the needs of our changing operating environment. The next phase of this work will be to ensure that the core values are fully integrated into all aspects of NIWA's activity.

The dynamic environment for NIWA's services makes on-going workforce planning and development essential to ensure that the right skill mix and diversity of staff is retained, recruited, and nurtured. This requires taking a longer term view of workforce needs, and a willingness to invest strategically in growth areas. It involves paying greater attention to the pipeline of talent available to NIWA through the education sector, and maximising opportunities to collaborate with tertiary education providers to ensure the supply of talent matches NIWA's needs. There is now a pan-CRI focus on workforce planning and development to help address such challenges, and NIWA will continue to actively pursue the effectiveness and efficiency gains available through this pan-CRI collaboration.

### Health and Safety

Active hazard management of all NIWA operations and business activity is required to ensure the safety of staff, contractors, suppliers, visitors and research partners. NIWA's activities involve a number of critical risk areas, including water activities, fall prevention, work-vehicle activities, hazardous substances management and energy or electrical operations. Everyday risk areas include manual handling, fatigue management, plant and equipment use and repetitive work activities.

To build on the achievements of previous years, an improvement strategy is being introduced (NIWA Safe), which will help guide the pathway to zero harm and the management of all safety risks in the business. This will involve focus on five key disciplines of safety activity:

- ▶ **Leadership** – enhancing the safety leadership capability of management staff
- ▶ **Systems** – increasing system efficiency and effectiveness
- ▶ **Behaviour** – introducing human error prevention practices
- ▶ **Preventative Care** – increasing physical movement intelligence in field and laboratory work
- ▶ **Curative Care** – improving operational efficiency and self-management ability.

### 2013/14 Actions

Key actions include:

- ▶ ongoing review of NIWA's capability and capacity to maintain the optimal size, skill mix, and diversity for the organisation
- ▶ embarking on the second annual round of Workforce Planning sessions with each National Science Centre and support function and extending the approach to develop an overall NIWA Workforce Plan
- ▶ renewing the focus on leadership development by contributing to the formation of a pan-CRI Leadership Development programme
- ▶ continuing evolution of NIWA's identified core values and ensuring these values are embedded in the behaviours and decisions on a daily basis
- ▶ building on the success of last year's inaugural NIWA Excellence Awards and Leaders' Forum event
- ▶ further embedding continuous improvement as part of NIWA's culture and ethos
- ▶ improving the onboarding and induction process for new recruits
- ▶ improving induction and support for new managers to equip them to carry out their responsibilities effectively
- ▶ continuing to support initiatives aimed at increasing collaboration and resource sharing across CRIs and the tertiary education sector, to ensure that NIWA benefits from these opportunities
- ▶ implementing the new NIWA Safe improvement strategy, with its focus on leadership, systems, behaviour, preventative care and curative care
- ▶ continuing to enhance safety standards on NIWA's vessels.

### Background

Information technology is an inherent part of the science we do and the delivery of that science to our customers. Our environmental data collection and modelling at finer spatial and temporal scales and over a greater number of parameters fuels demand for increased computing power and data storage. The 'value-add' to customers of presenting data in geospatial and geotemporal formats and in real-time is significant. NIWA needs best-fit IT systems and services that ensure these demands and opportunities can be met and realised.

IT is also an enabler to improve the efficiency and effectiveness of our operations. NIWA has introduced new IT-based tools in the last few years to help streamline some of its processes (e.g., performance evaluations, recruitment, and internal funding allocations) and this will continue.

NIWA evaluates potential investments in capital and staff resources for IT against six high-level goals:

1. Data, information, and knowledge are readily captured, stored, interconnected, shared, re-used, and traced back to their origins
2. Customers can acquire and interact with data and knowledge from NIWA via integrated e-delivery channels
3. Access and collaboration is frictionless and seamless across NIWA and around the globe
4. Systems and standards encourage science innovation and deliver gains in operational efficiency and effectiveness
5. Computing, storage and network capacity is well-matched to reasonable demand
6. IT Group staff contribute their skills directly to science projects, organisational improvement projects, and operational-support work.

Much progress has been made over the past few years towards establishing a resilient and robust infrastructure that is also adaptable, extensible, and interoperable. NIWA's recent migration to mainstream core systems provides new opportunities to integrate and interconnect information and provide enhanced collaboration and customer services. In particular, the growing uptake of smartphones and tablets, coupled with the decreasing cost of mobile broadband and the emergence of app stores, provide low-cost opportunities to deliver information anywhere/anytime to those making decisions in their business or personal lives.

In the global science community, the use of e-science continues to build. Important enablers of e-science worldwide are high-performance computers, high-speed networks, and distributed computing. New Zealand universities, CRIs, and other stakeholders are working together to implement the National e-Science Infrastructure (NeSI). NIWA has doubled the capacity of its high-performance computing facility (HPCF) in 2012/13 to enhance opportunities for use by the wider research community while supporting NIWA's core science activities. NIWA has also become an active participant in the sector-wide Tuakiri federation, which simplifies identity management for CRIs and universities so that researchers and students can easily access services like those provided through NeSI.

### 2013/14 Actions

NIWA will continue to invest in IT to enable our science strategies to be delivered and enhance our operational efficiency and effectiveness. During 2013/14 NIWA will:

- ▶ continually evaluate the opportunities afforded by All-of-Government and National e-Science Infrastructure initiatives, e.g., remote computing, storage, and backup solutions, and implement those that provide operational and/or financial benefits
- ▶ continually enhance our collaboration and knowledge-sharing and information management tools, especially those for collaboration-at-a-distance
- ▶ invest in a mobile data-management solution that allows for more effective and secure use of the growing fleet of mobile devices and enables bring-your-own-device (BYOD) options without compromising the security of the information NIWA holds on behalf of its customers
- ▶ continue engagement in NeSI, Tuakiri, and other e-science initiatives as they arise.



### Background

NIWA has a very strong brand and reputation, based on providing high-quality impartial advice. Our communications are focused on reinforcing the values and integrity underlying that brand. We aim to raise awareness of the contribution our science makes to New Zealand and New Zealanders, and the issues associated with our core purpose. Our goal is to lead and inform the discussion, and, in particular, communicate the value and application of our science in a way that facilitates uptake.

NIWA has an excellent track record in achieving mainstream media exposure. The substantial public interest in the issues relating to our mandate is served through a very active and responsive media engagement and public relations strategy. Because many of our key stakeholders and customers are still focused on mainstream media, we will continue our efforts in this arena. However, we will also continue to explore opportunities to enhance communication using new and/or specialist media channels.

Digital and social channels are increasingly the focus for media and the public. Mainstream media are rapidly transferring their diminishing resources into these channels to maintain relevance. NIWA's digital and social media presence will continue to evolve in response to the fast-changing trends and technologies that characterise this domain.

### 2013/14 Actions

NIWA will undertake the following activities to ensure effective communication and uptake of our science:

- ▶ promote NIWA's brand values, roles and capabilities to stakeholders, customers and the public via traditional and new avenues and technologies
- ▶ produce marketing collateral that clearly describes the contribution NIWA can make towards meeting the needs of the sectors we serve
- ▶ collaborate with other science providers and natural resource sector stakeholders to promote the benefits of science and evidence-based decision making
- ▶ implement a plan to better measure the effectiveness of NIWA's communications and marketing activities
- ▶ ensure our website attracts and rewards visitors with continually improved content that is aligned with our stakeholder and customer engagement and marketing strategies, and complements other outreach activities
- ▶ maintain and enhance NIWA's high profile in the mainstream media (print, radio, and television – and their digital channels) through a proactive programme of engagement
- ▶ explore possibilities for enhanced knowledge transfer and customer and stakeholder engagement through new and/or specialist media
- ▶ continue to evolve NIWA's social media presence
- ▶ use feedback from the 2012 readership survey of NIWA's flagship publication, Water & Atmosphere, to improve its readership appeal
- ▶ implement a new strategy for enhancing internal communication (including the revised intranet), ensuring our people better understand NIWA-wide goals and strategies, are involved in and informed about key decisions that affect them, and feel motivated, empowered and valued.

### Background

NIWA continues its focus on implementing and enhancing finance and administration systems such that they support front line staff in their interactions with customers, help manage science projects and provide the data necessary to manage finances.

The emphasis on streamlining processes under centralised and automated systems has given front line staff more agility and made it easier to complete administration tasks under a framework of 'high trust' and 'high compliance'.

### Improved Administration Platform

In 2012 NIWA implemented the Cognos Business Intelligence tool and the Unimarket Procure to Pay system. In addition the Oracle Financial Suite (including the Expenses, Time Cards, Accounts Payable, Accounts Receivable, Purchasing and Project Management modules) was upgraded to the latest version. These key systems were the catalyst for transitioning from a regional finance and administration support model to a centralised model with the aim of enabling the finance and administration functions to be better, faster, cheaper and easier to use.

Accordingly, focus has now shifted from implementation of the new systems to optimising performance from those tools and in so doing improving visibility of financial information across the organisation. Further efficiency gains are expected to be achieved as we look to simplify processes and increase the level of utilisation of the self-service applications.

The benefits of Business Intelligence are starting to provide project managers with a more informed view of project status and performance.

### 2013/14 Actions

- ▶ continue to enhance the project management system and develop the skills of project managers and administrators to leverage off its functionality
- ▶ develop new business intelligence tools including pricing, budgeting and forecasting tools
- ▶ investigate, select and implement an asset management system to maximise the return on investment through efficient utilisation
- ▶ investigate, select and implement a data analytics tool to enhance internal audit within the new electronic operating environment
- ▶ investigate and plan the implementation of an Enterprise Risk Management system
- ▶ continue to explore and participate in shared services opportunities across CRIs and wider government.

### The Science Strategy Process

To deliver on the Outcomes in our Statement of Core Purpose, NIWA's science and knowledge transfer activities are organised through 10 National Science Centres that are aligned to industry sectors and/or resources. These Centres are led by Chief Scientists and Centre Management Teams comprising our leading scientists. National Science Centres are 'virtual' and do not represent an operational structure, with staff working across Centres, applying their skills as appropriate.

Each Centre Management Team is responsible for ensuring development and delivery of Centre Science Plans that seamlessly link research and knowledge transfer to best meet national benefit outcomes by:

- ▶ Taking into account government and private sector policies and strategies, and the high-level strategic directions and priorities for NIWA determined by the Board and informed by advice from Strategic Science and End-User Advisory Panels (see Appendix 2 for the current membership of these panels)
- ▶ Engaging with end users to ensure their needs on specific issues are understood and taken into account. This includes seeking comment on science directions and the most appropriate technology transfer mechanisms. NIWA's science is utilised by a wide range of end users and, therefore, technology transfer mechanisms are tailored to the needs of specific end-user groups rather than following a 'one size fits all' strategy. Technology transfer mechanisms are described for each National Science Centre in the sections that follow. Stakeholder Advisory Panels provide important guidance in this respect (see Appendix 2 for the current membership of these panels)
- ▶ Developing science programmes with staff that align with NIWA's strategy, are responsive to stakeholder need, are of high quality and contain the appropriate mix between near-term and longer-term outlooks of benefit
- ▶ Forming collaborations and alliances with others to ensure a 'right team' approach to science and its application.

The development of Science Plans takes a holistic view and includes all activities required to deliver core purpose outcomes no matter what the funding source (Core Funding, Contestable Funding, or Commercial revenue sources). Science Plans are central to NIWA's overall strategic planning process, ensuring that priority science needs drive the functional and infrastructure support needs of the organisation. They are 'living' documents, reviewed on an annual basis.

The following sections provide summaries of these Science Plans and the table below summarises which outcomes in NIWA's Statement of Core Purpose each National Centre's science programmes are aimed at addressing (each programme often addresses more than one outcome).

Centre	Core Purpose Outcome					
	1	2	3	4	5	6
Aquaculture	✓				✓	
Fisheries	✓				✓	✓
Coasts & Oceans	✓				✓	✓
Freshwater & Estuaries	✓	✓		✓	✓	
Hazards			✓	✓		
Climate			✓	✓		✓
Atmosphere				✓		
Environmental Information	✓	✓	✓		✓	
Te Kūwaha	✓	✓		✓	✓	
Pacific Rim	✓	✓	✓			

The six outcomes outlined in NIWA's Statement of Core Purpose are:

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 South-West 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 process by which Science Plans are developed is also integral to NIWA's investment of Core Funding. This is discussed below.

### Core Funding Investment

NIWA receives \$42.85M per annum in Core Funding (approximately one-third of its revenue) to assist in the delivery of the outcomes in its Statement of Core Purpose. The final decision on the allocation of this Core Funding is made by the NIWA Board as an outcome of the annual science strategy process and after receiving recommendations from the NIWA Executive and advice from its Strategic Advisory Panels.

In making Core Funding allocations, consideration is given to the following:

- ▶ The relative potential for economic, social and environmental benefits from the science proposed. Is the science relevant to government and sector priorities within our core purpose, and aligned with NIWA's wider strategy?
- ▶ The capability and capacity of end users to take up the science and apply it. Do clear pathways for adoption exist? Are the proposed end users receptive and willing to invest 'to make it happen'?
- ▶ Is the science proposed of high quality? Has the best team been assembled from within NIWA and with our collaborators? What is the track record of the team in delivering on its promised outputs and outcomes?
- ▶ Does the research contribute to New Zealand's interests in science diplomacy or meeting our international obligations on global issues?
- ▶ Strategic research often takes time to deliver and funding stability can be important to ensure benefit returns from sunken investment. Is there an appropriate mix of investments, from near-term to provide benefit now, to long-term to provide future benefit?
- ▶ Is there unique science capability that is at risk and necessary for NIWA to deliver on its core purpose?
- ▶ What research and knowledge transfer activities are funded from other sources and, therefore, what are the gaps?
- ▶ The overall balance within each area of science between knowledge transfer activities and the research required to continue to 'fuel the knowledge pipeline'.

Since the introduction of Core Funding in July 2011, NIWA has pursued a strategy of re-aligning our investment to those activities targeted at increasing the transfer of science knowledge to end users (see table).

	Actual \$M June 2011	Actual \$M 2011/12	Actual \$M 2012/13	Budget \$M 2013/14
<b>Research</b>				
<b>NIWA</b>	26.3	20.3	19.3	18.8
<b>Subcontractors</b>	3.7	3.7	3.7	3.7
<b>Capability</b>	2.0	2.0	2.0	1.8
<b>Subtotal</b>	<b>32</b>	<b>26</b>	<b>25</b>	<b>24.3</b>
<b>Knowledge Transfer/ Tools</b>	10.8	16.8	17.8	18.5
<b>Total</b>	<b>42.8</b>	<b>42.8</b>	<b>42.8</b>	<b>42.8</b>

In 2013/14 we will continue with this strategic shift although to a lesser degree as an appropriate balance between research and its transfer is reached.

Our Core Funding will be invested in:

- ▶ research by NIWA staff (\$18.83M)
- ▶ research sub-contracted to collaborators, to form the best teams (\$3.71M)
- ▶ knowledge transfer (including development of management models, guidelines and protocols, and demonstration of their application) to enhance adoption and delivery of outcomes (\$18.51M)
- ▶ Investment in science capability aimed at implementing strategic aspects of our workforce planning (\$1.8M), including:
  - ▶ research sabbaticals to gain new perspectives for our science
  - ▶ secondments to stakeholder organisations, to better understand their needs and how science is adopted within their organisation
  - ▶ technical training to keep abreast of new techniques and technology
  - ▶ visiting experts to transfer knowledge and skills that advance key areas of science
  - ▶ strategic recruitment (including postdoctorates) in areas of emerging skill shortage.

The investment of 2013/14 Core Funding across National Centres is summarised below.

Centre	2013/14 Core Funding (\$M)
<b>Aquaculture</b>	4.84
<b>Atmosphere</b>	5.55
<b>Climate</b>	3.79
<b>Coasts &amp; Oceans</b>	9.86
<b>Environmental Information</b>	6.34
<b>Fisheries</b>	1.58
<b>Freshwater &amp; Estuaries</b>	3.88
<b>Hazards</b>	4.56
<b>Pacific Rim</b>	0.18
<b>Te Kūwaha</b>	0.50
<b>Capability</b>	1.77
<b>Total</b>	<b>42.85</b>

There are no significant (>10%) shifts in Core Funding *between* Centres from previous years' allocations, with key areas for increased investment being accommodated by the priority setting processes *within* Centres. These key areas for increased investment are:

- ▶ Servicing an enhanced climate observation network so that better data can be provided to weather and climate sensitive sectors, within the Environmental Information Centre
- ▶ Developing more user-friendly tools for the delivery of environmental data and forecasts to the public and developing tools tailored to the needs of key sectors, within the Hazards Centre
- ▶ Science targeted to support implementation of the freshwater management reforms, within the Freshwater & Estuaries Centre
- ▶ Research targeted to support a greater understanding of marine resources so that the developing Oceans Policy can be evidence-based, within the Coasts & Oceans Centre.



## AQUACULTURE

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management and use of aquatic resources
- ▶ Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity.

MBIE  
Core 82%

Commercial  
18%



Current Revenue Mix

Sector and government strategies for growth of New Zealand's \$300M+ per annum aquaculture industry recognise the economic opportunity offered by increased production capacity and efficiency for established species and diversification into high-value species and products. Achieving production system efficiencies and species diversification will require that returns are sufficiently high and risks are sufficiently low to encourage the considerable investment required. NIWA's science seeks to provide that investment climate by determining suitable marine space and developing proven production technologies that can provide profitable returns while operating with a low environmental footprint.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**New Zealand aquaculture will be a financially and environmentally sustainable billion dollar export industry by 2025 through the production of high-value species, both established and emerging, that meet market demand for products with verifiable quality and sustainability attributes.**

NIWA plans to invest c. \$24M of its Core Funding over the next 5 years to deliver on the science programmes described below and transfer this knowledge to the industry and other stakeholders. NIWA's Bream Bay aquaculture facility is well-established through previous capital investment. It is anticipated that industry (and suppliers of products to industry) will increasingly invest in NIWA's capabilities and take on capital risk as opportunities move from R&D to commercial ventures.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Develop reliable and efficient techniques for the commercial-scale production of established and emerging high-value aquaculture species (Core Funding 2013/14 of \$2.02M)
2. Develop the underpinning science, monitoring tools and farm management systems that quantify and minimise the environmental effects of aquaculture while optimising production and minimising the risks to aquaculture from environmental stressors (Core Funding 2013/14 of \$1.33M)
3. Develop breeding and genetic technologies and apply these to the development of elite stocks that provide the New Zealand industry with sustained competitive advantage (Core Funding 2013/14 of \$1.39M).

In addition, \$0.10M of Core Funding will be used to support specific sector engagement and promotional activities.

## Relevance to Stakeholders

- ▶ Growing global demand for seafood, when placed alongside finite wild fisheries resources, means that aquaculture must grow to fill the supply gap
- ▶ Finfish aquaculture is an opportunity specifically identified in the Government's Economic Growth Agenda and the Ministry for Primary Industries has been tasked with developing a National Aquaculture Strategy and implementing it. Recent government initiatives that have lowered the legislative barriers to accessing suitable marine space for finfish farming are stimulating investor interest, both from within New Zealand and offshore
- ▶ Shellfish production will continue to be a key component of New Zealand aquaculture. Key aspects of performance (recruitment and retention of spat, growth and condition to harvest) are controlled by interactions between the environment and the production system. Effective mitigation of the effects of pathogens and parasites in established and emerging species is achieved through an understanding of the production system, biophysical environment and the susceptibility of the farmed stock to disease
- ▶ Recognition within the sector that their growth target of \$1 billion per annum by 2025 requires introduction of new high-value farmed species and products that offer opportunities for market differentiation and premium branding
- ▶ The continuing need of existing marine farming operations for science advice on disease, genetic improvement, site suitability and resource consenting
- ▶ The start-up of new aquaculture is a high-risk activity requiring significant capital investment over extended periods before profitable returns are realised. Good science, at sufficient scale, is required to lower start-up risk and improve return so that investment is encouraged. Reliable access to improved breeding stock and technologies for juvenile production, on-growing and risk management are key components in assessing any aquaculture venture
- ▶ Communities and consumers are demanding that the environmental footprint of aquaculture is minimised and verifiable. Regulatory and certification bodies need monitoring guidelines to provide that surety, and industry will increasingly seek operating guidelines to achieve those expectations while ensuring their enterprises remain profitable.

## Key Science Collaborations

- ▶ University of Auckland, through the Joint Graduate School in Coastal & Marine Sciences, to ensure building of New Zealand's science capacity to meet the future needs of the sector
- ▶ University of Otago, Victoria University and AgResearch for specialist capabilities in genetic analysis to inform our selective breeding programmes
- ▶ Cawthron Institute for collaborative work on shellfish diseases and environmental guidelines
- ▶ Research institutes in China, Canada, Norway, Scotland and Australia with expertise in aquaculture.

## Knowledge and Technology Transfer/ Commercialisation

- ▶ Work collaboratively with industry to conduct joint trials of new species, improve efficiency of production from existing species and develop techniques for reducing the environmental footprint of marine farming
- ▶ Develop new finfish diets in collaboration with feed manufacturers
- ▶ Continue to describe the economic opportunities to be derived from environmentally sustainable aquaculture to appropriate government and regional economic development agencies. Work with the Ministry for Primary Industries Aquaculture Unit and regional authorities to determine those areas of marine space most suited to aquaculture and the monitoring protocols required to gain assurance that environmental limits are not being exceeded
- ▶ Present business opportunities for aquaculture to existing industry players, new investors (including off-shore investors) and their financial advisors
- ▶ Participate, as appropriate, in public-private partnerships that assist in establishing new species aquaculture in New Zealand, including access to intellectual property and infrastructure to grow fingerlings and elite broodstock
- ▶ Work with industry, national and international agencies to develop the tools and underpinning science to implement appropriate environmental certification standards for aquaculture products.

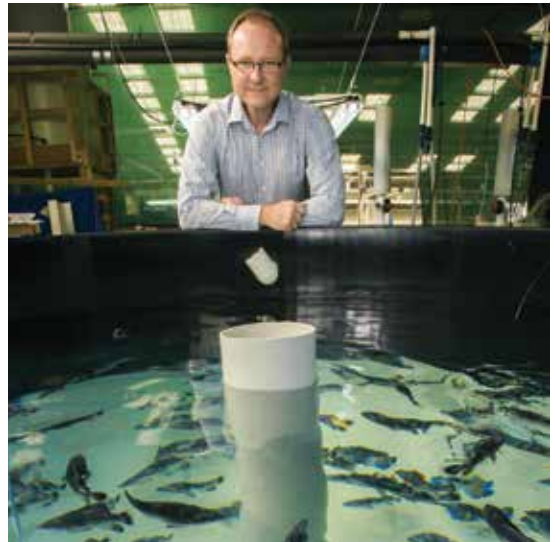


### Impact Measures

1. Industry farming of new species of finfish has been successfully established and is making a significant contribution to sector revenue growth
2. Improved performance of established aquaculture species has led to increased profitability of the sector
3. The environmental footprint of marine farming activities has been minimised and the product quality improved, such that New Zealand's aquaculture products meet eco-certification and quality criteria for premium markets.

### Key Performance Indicators

1. Partnership established with industry for commercial start-up of finfish aquaculture by July 2014
2. Elite breeding stock has led to a demonstrated increase in productivity for at least one aquaculture species by July 2014
3. Models that predict the effects of aquaculture activities on the nutrient and oxygen status of the water column and seafloor are developed and verified by July 2016
4. Development of an aquaculture management framework that integrates financial, production and environmental models to assist farmers to optimise production while operating within accepted environmental limits by July 2017.



*Dave Allen*



# FISHERIES

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management and use of aquatic resources
- ▶ Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity
- ▶ Increase understanding of the Antarctic and Southern Ocean climate, cryosphere, oceans and ecosystems and their longer-term impact on New Zealand.

Commercial  
89%

MBIE  
Core 11%



*Current Revenue Mix*

New Zealand's fishing industry currently exports about \$1.3 billion per year of wildfish product. Stock monitoring and assessment for species under the Quota Management System is essential to ensure that fish stocks are sustainably managed whilst allowing for maximum catch and economic benefit. There is a growing need for eco-labelled or certified products that meet international best-practice standards for fisheries sustainability and management and for reducing the adverse environmental effects of fishing. The need for more holistic ecosystem approaches to fisheries is also increasing, especially where the complex interaction of multiple environmental and anthropogenic factors impact on fish productivity and ecosystem health. Our science aims to grow the economic returns from our fisheries through sound stock and environmental management, such that the harvest is sustainable and the product is desired in the marketplace.

### **National Benefit and Investment**

This Centre will contribute to the following national benefit:

**New Zealand maximises sustainable long-term economic benefit from its fisheries and associated ecosystems through a science-based management system accepted as international best practice.**

NIWA plans to invest c. \$8M of its Core Funding over the next 5 years on research to help deliver on the science programmes described below and transfer this knowledge to stakeholders. Most of the funding in this Centre is derived from the Ministry for Primary Industries, to deliver assessments of stock and understanding of the effects of fishing. This Centre depends on the specialist capabilities of NIWA's vessels and associated acoustic equipment.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Develop and apply stock monitoring and assessment methodologies for New Zealand's fisheries to enable monitoring and prediction of changes in fish population biology, fish stock biomass, and size and age composition (Core Funding 2013/14 of \$0.7M)
2. Develop and apply standardised methodologies to monitor and assess international fisheries outside the New Zealand EEZ and determine the environmental effects of fishing (Core Funding 2013/14 of \$0.03M)
3. Determine the impact of fisheries on the aquatic environment to inform an ecosystem-based approach to fisheries management and contribute to broader ecosystem-based management approaches in conjunction with the Coasts & Oceans Centre (Core Funding 2013/14 of \$0.75M).

In addition, \$0.10M of Core Funding will be used to support specific sector engagement and promotional activities.

## Relevance to Stakeholders

- ▶ Ministry for Primary Industries, fishing industry, and Māori objectives for managing and utilising New Zealand fisheries resources require both on-going monitoring and assessment of fish stocks by species and a developing need for wider ecosystem approaches to fisheries and their management
- ▶ The Department of Conservation and environmental non-governmental organisations seek to manage and mitigate the impacts of fishing on non-target species and the aquatic environment
- ▶ Recognition that research is needed to support single-species management of the 96 species (628 fish stocks) under the Quota Management System (QMS), with a focus on key species
- ▶ Meeting international obligations under various agreements (e.g., United Nations Convention on the Law of the Sea, Convention on the Conservation of Antarctic Marine Living Resources, Convention on Biodiversity, South Pacific Regional Fisheries Management Organisation, Western and Central Pacific Fisheries Commission, Convention for the Conservation of Southern Bluefin Tuna)
- ▶ Sourcing, by large international food companies, of seafood that has been sustainably produced to meet growing consumer demands for improved environmental performance.

## Key Science Collaborations

- ▶ Researchers in New Zealand and overseas who have specialist expertise related to fisheries monitoring, population modelling, effects of fishing and ecosystem modelling research
- ▶ Partnership with management agencies, especially the Ministry for Primary Industries, the Department of Conservation, fishing companies and Māori, to ensure our research continues to add value
- ▶ Research organisations active in Antarctic and Pacific marine research
- ▶ Plant & Food Research with expertise in post-harvest seafood quality
- ▶ Victoria University and University of Auckland, through the Joint Graduate School in Coastal & Marine Science, to ensure building of New Zealand's science capacity to meet the future needs of the sector.

## Knowledge and Technology Transfer/ Commercialisation

- ▶ Direct engagement with the fishing industry to better understand needs and develop solutions that deliver financial benefits
- ▶ Present business opportunities for improving fisheries performance to the Ministry for Primary Industries, fishing industry, recreational fishers and Māori
- ▶ Conduct annual surveys, characterisations, analyses, and assessments for the Ministry for Primary Industries, Department of Conservation, Ministry of Foreign Affairs and Trade, fishing industry, and Māori
- ▶ Present the results to Māori and stakeholder working groups at international forums and in research reports.

## Impact Measures

1. New Zealand fisheries continue to be recognised internationally as well managed and sustainably used
2. The value of New Zealand seafood exports based on the wild fisheries increases as premium markets are secured through environmental certification.

## Key Performance Indicators

1. Partnerships developed with fishing companies have led to the uptake of new techniques and technologies that have added value to their operations by July 2014
2. New knowledge of natural and human impacts on coastal fisheries has been acquired to aid future fisheries management by July 2015
3. Tools and techniques for advancing ecosystem approaches to fisheries have been developed and applied to at least one fishery by July 2015
4. A broader ecosystem-based management approach that includes a fisheries component has been developed (in conjunction with the National Centre for Coasts & Oceans) by July 2017.



# Q

## How is NIWA helping the New Zealand fishing sector grow sustainably?

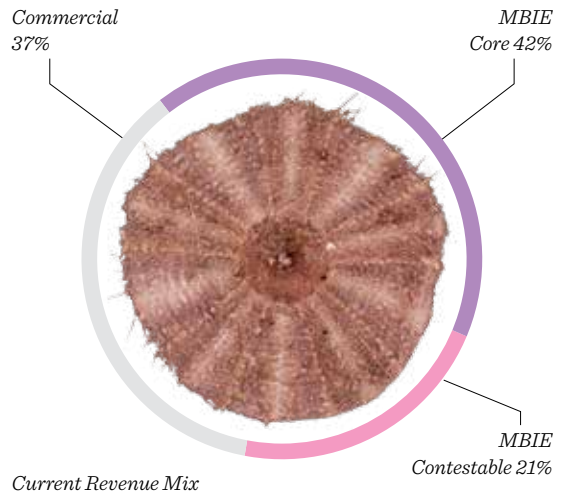
A: Robust science is critical to the sustainable use of New Zealand's substantial fisheries. Our Exclusive Economic Zone (EEZ) is home to over 16,000 marine species, and 130 of those are fished commercially, earning the New Zealand economy \$1.3 billion in exports each year. Our science is helping to ensure sound fish stock and environmental management by developing and applying stock monitoring and assessment methodologies, helping to monitor and assess international fisheries outside the EEZ and investigating the environmental effects of fishing to help inform an ecosystem-based approach to fisheries management. Much of this work depends on the specialist capabilities of NIWA's research vessels.



## COASTS & OCEANS

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management and use of aquatic resources
- ▶ Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity
- ▶ Increase understanding of the Antarctic and Southern Ocean climate, cryosphere, oceans and ecosystems and their longer-term impact on New Zealand.



New Zealand's EEZ and Legal Continental Shelf collectively cover 5.7 million km<sup>2</sup> of ocean, over 20 times our land area, with approximately 15,000 km of coastline. With 75% of New Zealanders living within 10 km of the coast, there are often conflicts associated with the multiple economic, cultural, spiritual and recreational uses. Our maritime region has a complex seabed and diverse range of habitats, is influenced by major ocean currents and riverine inputs, and supports a globally unique and diverse biota. It contains vast natural capital: oil, gas, mineral and energy resources and wild fisheries and is used in many ways by many New Zealanders. Despite this, substantial areas are still unexplored and our knowledge of marine resources and ecosystems is patchy. Science in the Coasts & Oceans Centre aims to provide the knowledge needed for greater economic value to be derived from our marine resources while ecosystem integrity and biodiversity are maintained.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**Enhanced stewardship of New Zealand's marine estate so that there are increased economic returns from marine resources and marine ecosystem integrity and biodiversity are maintained.**

NIWA plans to invest c. \$49M of its Core Funding over the next 5 years to deliver the science programmes described below and transfer tools and knowledge to stakeholders. In addition, contestable funding from the Ministry of Business, Innovation & Employment will provide for research on coastal and oceanic systems, including new investment to meet the National Science Challenges 'Life in a changing ocean' and 'The Deep South'. NIWA anticipates that regional and central government and industry will continue to commission applied investigations thereby contributing to the adoption of our science in marine resource management and use. This Centre relies on the specialist capabilities of NIWA's research vessels and will require continued capital investment in new equipment to ensure that our science remains at the forefront.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes, each of which spans coastal and oceanic environments:

1. 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 (Core Funding 2013/14 of \$2.12M)
2. Marine Biological Resources: Discovery and definition of the marine biota of New Zealand, the Ross Sea region and the Southern Ocean, and the physical and biogeochemical processes that sustain them to inform their sustainable management (Core Funding 2013/14 of \$4.10M)
3. Managing Marine Resource Use: Quantifying and predicting the effects of natural variability, climate change and anthropogenic stressors on New Zealand's marine environments and the ecosystem services they provide to enable ecosystem-based approaches to their management (Core Funding 2013/14 of \$2.15M)
4. Marine Biosecurity: Identifying and evaluating biosecurity threats to marine ecosystems from non-indigenous species and developing tools to reduce establishment and mitigate impacts (Core Funding 2013/14 of \$1.36M).

In addition, \$0.13M of Core Funding will be used to support specific sector engagement and promotional activities.

## Relevance to Stakeholders

- ▶ A National Oceans Strategy is being developed and science will be needed to underpin that strategy and assist in its implementation at the policy, planning, and consenting stages
- ▶ Recognition that limited knowledge of the character, distribution and resilience of New Zealand's marine habitats and the processes underpinning them is limiting potential use and management of marine resources and impeding the realisation of economic and social benefits
- ▶ New survey information will advance opportunities for industry to explore and use unexploited resources within the Exclusive Economic Zone while protecting environments critical to sustain natural biodiversity
- ▶ Development pressures on marine resources are increasing and there is a need for access to better information and resources to guide inclusive decision-making processes, especially in coastal regions subject to multiple stressors
- ▶ Marine biodiversity is declining globally and there is a need to identify the drivers of this loss and develop appropriate conservation measures
- ▶ New tools and technologies are needed to help prevent and reduce harm from non-indigenous pests and diseases as a result of global trade, travel and climate change
- ▶ New Zealand's requirement to meet obligations under ratified international agreements, e.g., the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), the Convention on Biological Diversity and the United Nations Law of the Sea.

## Key Science Collaborations

- ▶ Researchers in New Zealand and overseas for collaboration on geological resources, ocean observing programmes, coastal and ocean modelling, Southern Ocean and Antarctic research, invasive species, ecosystem-based management and biodiversity
- ▶ Museums for specialised taxonomic identifications, biosystematics collaboration and accession of specimens
- ▶ New Zealand universities, to build capacity in all aspects of marine science, including the Joint Graduate School in Coastal and Marine Sciences with the University of Auckland, the Centre for Aquaculture and Marine Ecology at Canterbury and the NIWA/Otago University Centre for Chemical and Physical Oceanography.



## Knowledge and Technology Transfer/ Commercialisation

- ▶ Provide knowledge and advice to mineral, petroleum, aggregates and marine energy companies seeking to explore and develop unexploited marine resources
- ▶ Provide knowledge and advice to the shipping, aquaculture and recreational boating sectors to reduce the rates of establishment and spread of marine pests
- ▶ Provide knowledge and advice to the tourism sector to support development of marine eco-tourism ventures
- ▶ Contribute to the development and implementation by government agencies of environmental guidelines, policies and regulations to guide future use and stewardship of marine resources
- ▶ Work with regional councils to assist with updating and implementing regional coastal plans, including planning for the effects of climate change on coastal communities, provision of ecosystem-based management tools, management of marine pests and prioritisation of habitats for conservation
- ▶ Contribute to international science programmes addressing global marine issues
- ▶ Work with Māori to identify, develop and implement methods for monitoring of marine resources and restoration of mahinga kai
- ▶ Provide information and data to stakeholders via a range of digital products, including web portals and databases
- ▶ Publish regional maps and charts of ocean characteristics and provide identification tools and guides of marine biota
- ▶ Contribute knowledge on the predicted regional impacts of global changes in the ocean on marine biota, including changes in climate, acidification and the distribution of non-native species. Provide input into the Intergovernmental Panel on Climate Change Fifth Assessment Report
- ▶ Establish the controls and drivers of spatial and temporal variation in primary production (foundation of marine food webs) and secondary production (how much energy is passed up the food chain) to inform ecosystem approaches to fisheries management.

## Impact Measures

1. Resource exploration has advanced in previously unexplored regions of the New Zealand Exclusive Economic Zone
2. Biodiversity metrics are used routinely to identify and manage representative and unique examples of marine communities
3. New Zealand has improved systems for environmental management of marine resources that have reduced the conflict between multiple users, protected vulnerable components and realised economic, social and environmental benefits
4. Border surveillance and incursion response tools reduce the risks to industry and New Zealand's marine ecosystems from the adverse impacts of aquatic pests.

## Key Performance Indicators

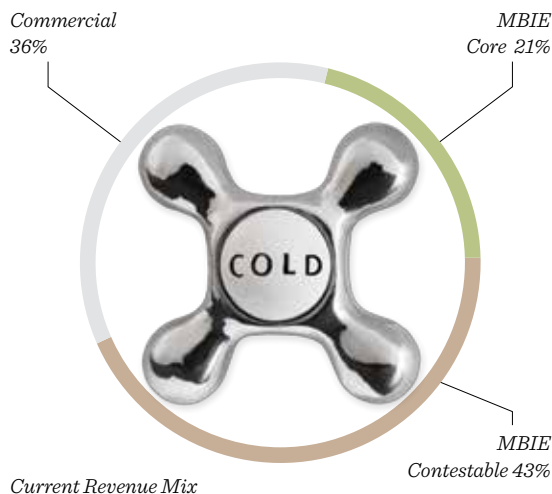
1. Information on the taxonomy and ecology of high-priority groups of marine biota has been provided to stakeholders by July 2014
2. Models and processes have been designed to advance ecosystem-based approaches to marine resource management by December 2014
3. Better systems have been developed for reporting national data on the observed and potential NZ distributions of key marine pests by July 2015
4. An improved risk assessment framework for prioritising threats to marine ecosystems has been developed by July 2015
5. Key regions with high potential for oil and mineral exploration have been surveyed in detail and mapped by July 2016
6. An operable strategy for monitoring marine ecosystem integrity has been developed in collaboration with the Department of Conservation by July 2017.



# FRESHWATER & ESTUARIES

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management and use of aquatic resources
- ▶ Grow renewable energy production through developing a greater understanding of renewable aquatic and atmospheric energy resources
- ▶ 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
- ▶ Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity.



New Zealand's freshwater and estuarine resources are a key national asset providing significant economic, social and environmental benefits. Competition for the use of these resources is intensifying, leading to declines in water quality and ecosystem health. In response, the government is moving to significantly reform the policy environment for the management of freshwaters<sup>5</sup>. These reforms are targeted at responding to the recommendations of the Land & Water Forum which concluded that new approaches for freshwater management that efficiently allocate the resources and meet societal expectations for water quality and ecosystem health were needed. Science within this Centre aims to provide the evidence-base for these new approaches such that returns within a greening economy are optimised within environmental constraints.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**New Zealand's freshwater and estuarine resources are wisely utilised for economic benefit and have water quality and ecosystem health that meet community expectations.**

NIWA will invest c. \$19M of its Core Funding over the next 5 years to deliver on the science programmes described below and transfer this knowledge to industry and other stakeholders. In addition, we expect that contracts from the Ministry of Business, Innovation & Employment will continue to provide c. \$7M per year to cover strategic research on freshwater systems and new investment to meet the National Science Challenges 'Our land and water' and 'New Zealand's biological heritage'. It is anticipated that local, regional and central government and industry will increasingly commission applied research from NIWA as new systems and policies are introduced for managing freshwater.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Water resources: Understanding and predicting the hydrological cycle (how much water, where and when) to improve water management (Core Funding 2013/14 of \$0.13M)
2. Sustainable water allocation: Understanding and predicting effects of human use and modification of rivers and groundwater systems for sustainable allocation (Core Funding 2013/14 of \$2.17M)
3. Causes and effects of water quality degradation: Understanding and predicting the sources of contaminants, technologies to clean up the sources, and consequences of water quality degradation for aquatic ecosystems and human uses of waters (Core Funding 2013/14 of \$0.35M)
4. Catchments to estuaries: Understanding and predicting the functional connections between catchments and estuaries to improve diffuse-source contaminant management (Core Funding 2013/14 of \$0.30M)
5. Freshwater biosecurity: Identifying and evaluating threats from non-indigenous species, minimising risks of their establishment and developing tools to mitigate their impacts (Core Funding 2013/14 of \$0.65M)
6. Ensuring ecosystem health: Developing techniques for biodiversity enhancement, rehabilitation and protection of freshwater values under future economic growth scenarios (Core Funding 2013/14 of \$0.13M).

In addition, \$0.15M of Core Funding will be used to support specific sector engagement and promotional activities.

<sup>5</sup> Freshwater reform 2013 and beyond, March 2013

## Relevance to Stakeholders

- ▶ Increased access to water is a key pillar of the government's plan for economic growth, but water resources over much of New Zealand will soon be approaching sustainable limits under existing allocation arrangements
- ▶ Regulators, iwi and water users require greater certainty on the total amounts of water in catchments and regions, what is required to meet in-stream values, and therefore how much is available for out-of-stream use
- ▶ Realisation that future intensification of land use for the benefit of the national economy must occur in a way that does not further degrade water quality and aquatic ecosystems, i.e., growth within limits
- ▶ Prompted by the National Policy Statement on Freshwater Management and subsequent water reforms signalled in the recently released *Freshwater reform 2013 and beyond*, there is now a requirement for regional councils to set water quality limits in consultation with stakeholders and then establish means to manage within those limits
- ▶ A growing national desire to restore degraded freshwater ecosystems and minimise impacts from alien invasive species will require science-based techniques supported by action from central and regional government, industry, iwi, and community groups.

- ▶ The *New Zealand Coastal Policy Statement 2010* calls for catchment approaches to sediment control and requires improvement of coastal water quality where this has deteriorated to the extent of showing significant adverse effects. Limit-setting for estuaries is a likely next step
- ▶ Government moves towards 'green growth' refer to the need for managing diffuse sources of pollution, resolution of environmental issues that arise from farming and forestry, increased resourcing for restoration and improving the quality of information on (amongst other items) hydrology, nutrient management, biodiversity and pest management.

## Key Science Collaborations

- ▶ Other CRIs conducting complementary research into on-land generation of contaminants, especially AgResearch
- ▶ Universities for work on lake and estuarine ecosystems and restoration of urban and rural waters
- ▶ International research institutes with expertise in hydrology, environmental flows, water quality, ecology, catchment modelling, biosecurity and restoration technology.

## Knowledge and Technology Transfer/ Commercialisation

- ▶ Provide technical advice to lead ministries developing and implementing new national freshwater policies in response to the recommendations of the Land & Water Forum
- ▶ Work with Ministry for the Environment and Statistics New Zealand on improving national water accounts and state of the environment reporting
- ▶ Provide technical advice to regional councils' freshwater policy, planning and management processes
- ▶ Work with Māori partners to enhance iwi capability in knowledge of their freshwater resources and ecosystem health, and to support co-governance and co-management
- ▶ Work with Ministry for Primary Industries and iwi fisheries managers on management of freshwater fisheries and on mitigation of land-use impacts on coastal habitats
- ▶ Provide methods to central and regional government for calculating catchment contaminant load limits given river, lake and estuary water quality and ecosystem health standards
- ▶ With collaborating research agencies, provide the science base for reducing contaminant movement from land to water
- ▶ Provide freshwater biosecurity advice to regional authorities, Land Information NZ, Department of Conservation and hydro-power companies and work with Ministry for Primary Industries to prevent new pest incursions and manage national-interest freshwater pest eradication programmes
- ▶ Demonstrate, and where appropriate commercialise, innovative small treatment systems for agricultural and small settlement wastewaters
- ▶ Continue outreach activities (short courses, field days, 'how-to' guides, workshops, collaborative projects) that help build awareness and skills within district and regional councils, stream care groups and industry sectors
- ▶ Remain involved in central and regional government technical advisory groups that provide direct conduits for knowledge transfer.

## Impact Measures

1. Increased economic benefit has been derived from use of our water resources in line with the Government's Business Growth Agenda
2. Implementation of new water policy and rehabilitation techniques has led to a measurable improvement in the quality and ecosystem health of the nation's freshwaters
3. Management agencies are able to apply a greater range of options to treat high-risk pathways for, and eradicate or control new and existing, freshwater pests
4. Reduced catchment-derived sediment and nutrient inputs to estuaries will have resulted in expanded seagrass, shellfish and juvenile fish habitats.

## Key Performance Indicators

1. Tools relating to monitoring and rehabilitation of freshwaters have been developed and transferred to end users by July 2014
2. By July 2014, at least one model relating land use to estuary health will have been used in management decisions by local government
3. Relationships between river flow and ecology have been incorporated into river management guidelines by July 2015
4. Tools for regional-scale simulation of the effects of water allocation on reliability of supply and their consequences for environmental values are available by July 2015
5. Improved tools for predicting and managing the effects of land use on water quality have been developed and adopted by July 2015
6. At least one novel method for control of aquatic pests has been identified and trialled for potential by July 2016
7. Innovative wastewater treatment technologies have been demonstrated and adopted by at least three local councils by July 2017
8. The capacity of at least one estuary to assimilate fine sediment has been determined and tools to calculate catchment sediment load limits, and incorporate results into estuary management plans have been developed by July 2017.

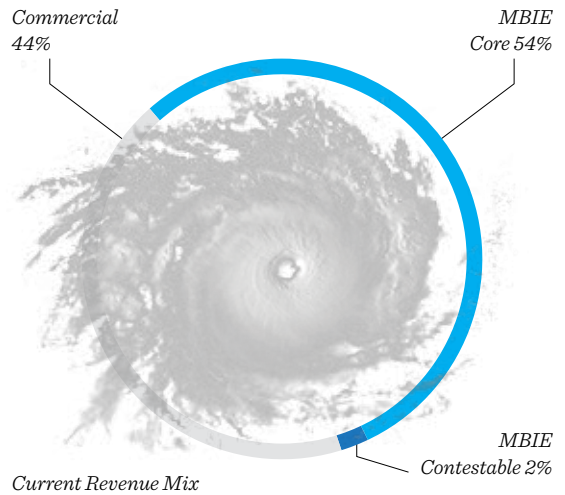


# HAZARDS

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase the resilience of New Zealand and South-West Pacific islands to tsunami and weather and climate hazards, including drought, floods and sea level change
- ▶ 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.





Our location over an active plate boundary in a windswept ocean in the roaring forties exposes New Zealand to earthquakes, storms, floods, tsunamis, landslides, damaging winds and waves, storm-surge and volcanic eruptions. The impact of these hazards on our society and the economy are enormous, and hazard risk continues to increase as the population and infrastructure grows. NIWA's science, in collaboration with others in the Natural Hazards Research Platform, will provide information and tools to reduce exposure to hazards, and provide timely forecasts to minimise the impacts of extreme events. The skills developed in this Centre are also applied in the Pacific Islands through the Pacific Rim Centre.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**New Zealand communities will be more resilient to weather-driven and marine geological hazards, reducing losses and speeding recovery, now and in an environment that is being modified by both climate and land-use changes.**

NIWA plans to invest c. \$23M of its Core Funding over the next 5 years on the research and delivery mechanisms required to inform planners or emergency management stakeholders and weather-sensitive sectors. This Centre's activities are also supported by contestable research funds from the Natural Hazards Research Platform and applied research commissioned by weather-sensitive industries. Revenue growth is anticipated through the National Science Challenge 'Resilience to nature's challenges'. Hazard forecasting is critically dependent on the NIWA High Performance Computing Facility and weather station network.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Develop predictive models of weather-related hazards and incorporate them into an operational multi-hazard forecasting system (Core Funding 2013/14 of \$3.28M)
2. Evaluate the risk, impacts and potential losses due to weather-related hazards to inform planning for mitigation and emergency response (Core Funding 2013/14 of \$1.18M).

In addition, \$0.10M of Core Funding will be used to support specific sector engagement and promotional activities.

### Relevance to Stakeholders

- ▶ Weather-related hazards have high economic impacts on many productive and infrastructure sectors of New Zealand, including agriculture, horticulture, transport and energy
- ▶ Legislation and government strategies signal a change in hazard response from a reactionary approach to risk assessment and reduction
- ▶ Investment in mitigation and/or planning by central and regional government relies on assessment of the comparative risk of various hazards threats
- ▶ National planning documents (e.g., Ministry for the Environment's Flood Risk Review) call for the ability to mitigate the economic, social and environmental impacts of future hazards through the application of reliable and accurate forecasts
- ▶ Improved forecasting accuracy will be required to ensure the security of electricity supply as the proportion of weather-dependent renewables increases.

### Key Science Collaborations

- ▶ Regional councils, the primary industry sector, energy generators and port companies for complementary meteorological and coastal hazard data
- ▶ GNS Science as host of the Natural Hazards Research Platform, joint-venture partners in the RiskScape tool and custodians of the National Seismic Hazard Model
- ▶ The Met Office (United Kingdom) for supply of observations, data assimilation and numerical weather prediction models, and collaborative research and development
- ▶ Engineers and social scientists to provide input on the vulnerability of structures and the direct and indirect hazard impacts and their costs
- ▶ International research programmes on the predictability and societal impacts of weather hazards (e.g., World Meteorological Organization's weather (THORPEX) and flooding (HEPEX) programmes).

### Knowledge and Technology Transfer/ Commercialisation

- ▶ Generate and deliver tailored operational forecasts (24/7) via the multi-hazards forecasting model system EcoConnect to key weather- and water-sensitive sectors
- ▶ Provide tools and information (e.g., frequencies and return periods for floods and coastal inundation) directly to national and local government, businesses, Civil Defence and emergency management groups, infrastructure and lifelines groups, and direct input into design standards (e.g., flood and wind-loading)
- ▶ Provide marine faulting information for the National Seismic Hazard Model
- ▶ In collaboration with local government, implement and update the RiskScape system. Demonstrate RiskScape to the insurance sector, emergency response and infrastructure agencies
- ▶ Provide input into land use and resource management plans, policies, regional and national policy statements and national environmental standards through workshops and submissions
- ▶ Apply skills off-shore (particularly to the Pacific Islands) to improve resilience of communities to weather and water-driven hazards and tsunami (see Pacific Rim, page 56).

### Impact Measures

1. Economic, social and environmental impacts of extreme weather events have been reduced through the application of improved hazard forecasts
2. Investment in hazard defences has been optimised through quantifying the risks from all natural hazards
3. New Zealand's proportion of renewable electricity generation has increased through the successful integration of new energy resources and more efficient operation of existing resources.



### Key Performance Indicators

1. Refined hazard exposure, fragility and vulnerability models have been developed and implemented in RiskScape for the significant New Zealand hazards by July 2014
2. RiskScape has been implemented and used to guide risk reduction in a Pacific nation by July 2015
3. New tools to forecast tornado likelihood and volcanic ash dispersal have been implemented and validated by July 2015
4. A nationally consistent method for estimation of flood statistics has been developed and supplied to regional councils by July 2015
5. Ultra-high-resolution EcoConnect forecasting models have been operationalised and taken up by key businesses in weather-sensitive sectors of the economy by July 2014
6. Coastal inundation modelling outputs, which include effects due to tides, storm surge, sea-level rise, ocean waves (including tsunami) and river floods, have been developed, validated and implemented in the EcoConnect forecast system by July 2016
7. All hazard (and quiet time) forecasts are based on a combination of very high-resolution models and model ensembles that provide uncertainty estimates by July 2017.



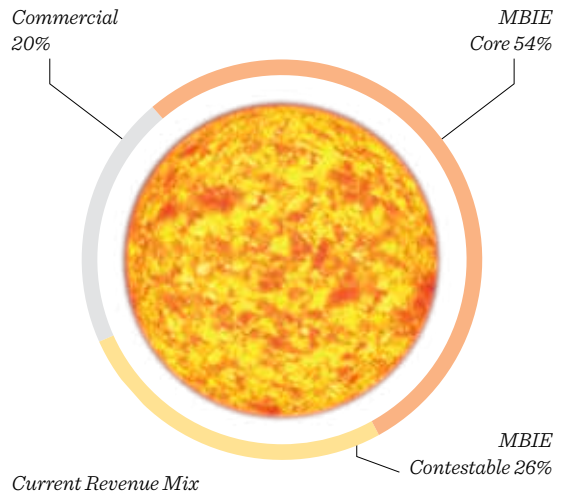
*Dave Allen*



# CLIMATE

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase the resilience of New Zealand and South-West Pacific islands to tsunami and weather and climate hazards, including drought, flood and climate change
- ▶ 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
- ▶ Increase understanding of the Antarctic and Southern Ocean climate, cryosphere, oceans and ecosystems and their longer-term impact on New Zealand.



Science in this Centre provides vital data, tools and knowledge that assist key sectors of New Zealand's economy, such as agriculture, horticulture, wine, forestry, fisheries, energy and tourism. Such sectors depend on favourable climatic conditions and are impacted by climate extremes and changes. NIWA's science contributes to international climate initiatives, assists central and local government to build resilience to climate fluctuations and enables productive sectors to prepare for and to exploit present and future climate.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**New Zealand is well prepared for and adapts effectively to the opportunities and impacts of our current climate and that resulting from climate change.**

NIWA plans to invest c. \$19M of its Core Funding over the next 5 years to advance research in the science programmes described below and transfer this knowledge to those who plan and undertake climate-sensitive activities and develop climate-related policies. Support for these activities also comes from the Ministry of Business, Innovation & Employment contestable fund, the Marsden Fund, central and local government agencies and climate-sensitive businesses. We will target an increasing contribution from businesses and local government by assisting them to reduce risk and maximise returns through access to and use of tailored climate data, products and information. NIWA's investment in updating its high-performance supercomputing facilities and the climate observing network provide a strong infrastructure base. Our knowledge, product development skills, and experience with end users are also recognised by Pacific Island countries seeking to build resilience to climate extremes and adapt to climate change. In collaboration with the Pacific Rim Centre we will continue to seek funding from international sources to support work with Pacific Island partners.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Observe, analyse and document the climate of New Zealand, the South-West Pacific, Southern Ocean and Antarctica – past and present (Core Funding 2013/14 of \$0.96M)
2. Determine how the dynamics of the climate system influence atmosphere, ocean, ice and hydrosphere conditions in our region, and identify the causes of changes (Core Funding 2013/14 of \$0.98M)
3. Develop improved predictions of climate and climate extremes on all timescales through dynamical modelling and statistical techniques (Core Funding 2013/14 of \$1.32M)
4. Determine present and future vulnerability, impacts and adaptation options to climate variability and changes in New Zealand, the South-West Pacific, Southern Ocean and Antarctica (Core Funding 2013/14 of \$0.38M).

In addition, \$0.15M of Core Funding will be used to support specific sector engagement and promotional activities.

## Relevance to Stakeholders

- ▶ Climate summaries and predictions at multi-week, seasonal and annual timescales help climate-sensitive sectors such as agriculture, forestry, energy generation, water supply, construction, and tourism maximise productivity and minimise risk
- ▶ Central and local government need decadal-to-century climate trends and projections to develop their policies and plans on use of land and water resources and preparation for natural hazards
- ▶ Other science groups, nationally and internationally, require regional climate information to determine the vulnerability, impacts and adaptation opportunities for natural and managed systems
- ▶ South-West Pacific Island nations need assistance with building their own capacity to deal with climate extremes and change. New Zealand carries commitments to such assistance through Agreements under the UN Framework Convention on Climate Change and related instruments
- ▶ A robust set of data and publications from our region is vital input for the Intergovernmental Panel on Climate Change Fifth Assessment Report (2014), which will provide an authoritative basis of information for international and national policy decisions on climate change.

## Key Science Collaborations

- ▶ National research organisations and universities on regional climate modelling, snow and Antarctic ice research
- ▶ The New Zealand Climate Change Centre for collaboration on, and dissemination of, climate-change science and adaptation and mitigation approaches
- ▶ Australian research organisations to share and develop expertise and joint projects on climate trends, climate dynamics and modelling, and Southern Ocean and cryosphere processes
- ▶ International organisations and agencies on climate modelling, detection and attribution of climate change, and atmosphere and ocean measurements, monitoring, analysis and dissemination
- ▶ Pacific development organisations to assist with climate monitoring, research and capacity building.

## Knowledge and Technology Transfer/ Commercialisation

- ▶ Continue to publish seasonal climate summaries and outlooks and provide public commentary on them
- ▶ Develop and deliver value-added climate products in response to the needs of climate-sensitive sectors
- ▶ Provide tools and guidance to help central and local government and climate-sensitive industries plan and prepare for projected climate variability and change
- ▶ Workshops, round-tables, conferences and publications for climate knowledge sharing and delivery through the New Zealand Climate Change Centre
- ▶ Assist with production of the Intergovernmental Panel on Climate Change assessment reports through author, reviewer and Working Group Vice-Chair roles.

## Impact Measures

1. Improved climate outlook and information products provide efficiencies and productivity gains for climate-sensitive sectors of the New Zealand economy
2. Organisations, sectors and councils manage vulnerabilities and exploit opportunities related to climate extremes and change.

### Key Performance Indicators

1. Every month up to and including June 2014 produce and publicly disseminate summaries of current climatic conditions plus outlooks for the coming season. Improve, update and deliver targeted products to end users
2. Deliver Lead Author and Review Editor material for the Intergovernmental Panel on Climate Change Fifth Assessment, and produce updated climate change scenario and impacts guidance material for end users by July 2015
3. Regional climate modelling has provided improved risk projections of New Zealand's future climate and extremes by July 2015
4. Research on climate processes has led to improved Antarctic sea-ice models, and determined causes of past changes in New Zealand's climate by July 2016
5. Modelling and research on regional climate enables us to make quantitative attribution statements on the likelihood of particular extreme events being caused or enhanced by climate change by December 2017.



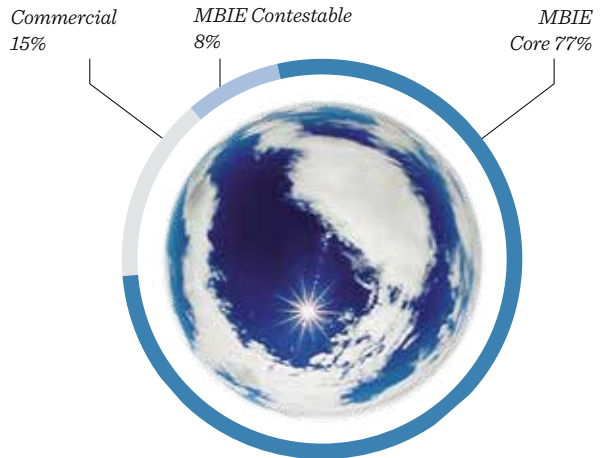
Craig Stewart



# ATMOSPHERE

**Science within this Centre addresses the following Outcome in NIWA's Statement of Core Purpose:**

- ▶ 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.



*Current Revenue Mix*

There is a need to reduce national emissions of green-house gases and air pollutants to meet international agreements and local regulations. New Zealand makes an important contribution to international knowledge by monitoring changes to the composition of the global atmosphere, as it is one of the few Southern Hemisphere countries with the appropriate expertise. NIWA's science will aim to further New Zealand's contribution to global initiatives to monitor and predict Southern Hemisphere atmospheric composition changes, validate emission mitigation measures, and develop future emission policies and standards. NIWA's skills are focused around high-precision measurement of atmospheric composition and emissions which complements well the skills of our collaborators in developing emission-reduction technologies.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**New Zealand reduces emissions of greenhouse gases, and local air pollutants, to mitigate long-term climate change and human health impacts.**

NIWA plans to invest c. \$28M of its Core Funding over the next 5 years on the science programmes described below. Revenue support from other sources is comparatively small and primarily related to air quality issues. Modelling and scenario generation is dependent on the NIWA High Performance Computing Facility.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Monitor atmospheric constituents relevant to climate change to report the state of the atmosphere and improve models that make long-term predictions of global change (Core Funding 2013/14 of \$2.3M)
2. Determine the role of oceans in governing climatically important gases and thereby improve global models and inform geo-engineering options (Core Funding 2013/14 of \$0.95M)
3. Quantify New Zealand's greenhouse gas emissions in order to improve national inventories and validate mitigation options (Core Funding 2013/14 of \$1.17M)
4. Determine the impacts of air pollutants on human health and evaluate mitigation options (Core Funding 2013/14 of \$1.07M).

In addition, \$0.06M of Core Funding will be used to support specific sector engagement and promotional activities.

## Relevance to Stakeholders

- ▶ Research contributes to major international science programmes (e.g., International Geosphere Biosphere Program, Surface Ocean Lower Atmosphere Study, International Global Atmospheric Chemistry, Stratospheric Processes and their Role in Climate, Network for the Detection of Atmospheric Composition Change (NDACC))
- ▶ Outputs contribute to the Intergovernmental Panel on Climate Change and World Meteorological Organisation/United Nations Environment Programme assessments and assist in meeting national responsibilities within the Montreal and Kyoto Protocols
- ▶ New Zealand's aims of reducing greenhouse gas emissions through the implementation of the Emissions Trading Scheme require science-based understanding of the sources and sinks of greenhouse gases and validation of emissions at a source and national level
- ▶ Ministry for the Environment requires a scientific basis for setting and revising National Environmental Standards (NES) for air quality. Regional councils are charged with meeting the NES and require tools and information to help them to quantify their emissions, assess policy and planning options, and validate the resulting mitigation
- ▶ Public health policy needs improved understanding of causality in air pollution epidemiology, requiring high-quality estimates of individual exposure.

## Key Science Collaborations

- ▶ Research partners for equipment and measurement coordination, and international agencies that contribute to global atmosphere measurement initiatives and support chemistry-climate and carbon-cycling models
- ▶ National and international universities in ocean chemistry, microbiology, air-sea dynamics, air quality and exposure to pollutants
- ▶ The Total Column Carbon Observing Network, Orbiting Carbon Observatory satellite team, and US and Japanese agencies for ground-based and satellite measurements
- ▶ The New Zealand Agricultural Greenhouse Gas Research Centre and the Ministry for Primary Industries research groups MethaNet and NzONet, and international organisations involved with agricultural greenhouse gas measurements.

## Knowledge and Technology Transfer/ Commercialisation

- ▶ Input of quality controlled data into international databases
- ▶ Input to Ministry for the Environment and Statistics New Zealand reporting of New Zealand's atmospheric composition and emissions
- ▶ Contributions to major international assessments such as the IPCC and WMO/UNEP ozone assessments and international programme reports
- ▶ Provide data on agricultural emissions, inventories and measurement/verification techniques to key government agencies
- ▶ Work directly with regional councils and through the Regional Council Air Quality Working Group for direct uptake of research results, tools and services to assist in meeting National Environmental Standards with respect to air quality
- ▶ Work with health researchers and professionals, providing information on air quality pollution exposure.

## Impact Measures

1. Atmospheric composition measurements from the New Zealand region have been used as input into international programmes that inform global science and policy on emissions and climate change
2. New Zealand's agricultural greenhouse gas emission reductions have been validated to internationally accepted standards
3. National Environmental Standards for air quality have been refined, regional councils are able to assess their air quality and meet standards, and exposure projections are used in urban planning.



### Key Performance Indicators

1. Quality controlled atmospheric measurements have been archived annually in major international databases, meeting standards for global monitoring and international research use, and provided to government agencies for use in New Zealand international reporting obligations
2. Estimates of the exposure to air pollution from heavy transport, on and near roads, have been made by July 2015, and results presented to key agencies, e.g., NZ Transport Agency, MfE and the Regional Councils Air Quality Working Group
3. State-of-the-art chemistry-climate models have been developed to predict future atmospheric composition changes and simulations included in global programmes and synthesis outputs by July 2015. Measurements of ocean CO<sub>2</sub> and pH have been provided annually to international databases and to MPI/MfE to estimate impacts and inform adaptation to ocean acidification
4. Ground-based remote sensing measurements have been developed and used with international partners to validate greenhouse gas estimates from satellite observations by July 2014
5. Paddock-scale measurements are accepted by MPI/MfE as an accurate validation technique for agricultural greenhouse gases emissions by July 2015
6. Human exposure to atmospheric pollutants in urban areas has been estimated and the main causes identified by July 2015, and relevant results provided to collaborating health researchers
7. Carbon-cycle models have been combined with satellite observations to estimate the net New Zealand emissions of CO<sub>2</sub> by December 2017.



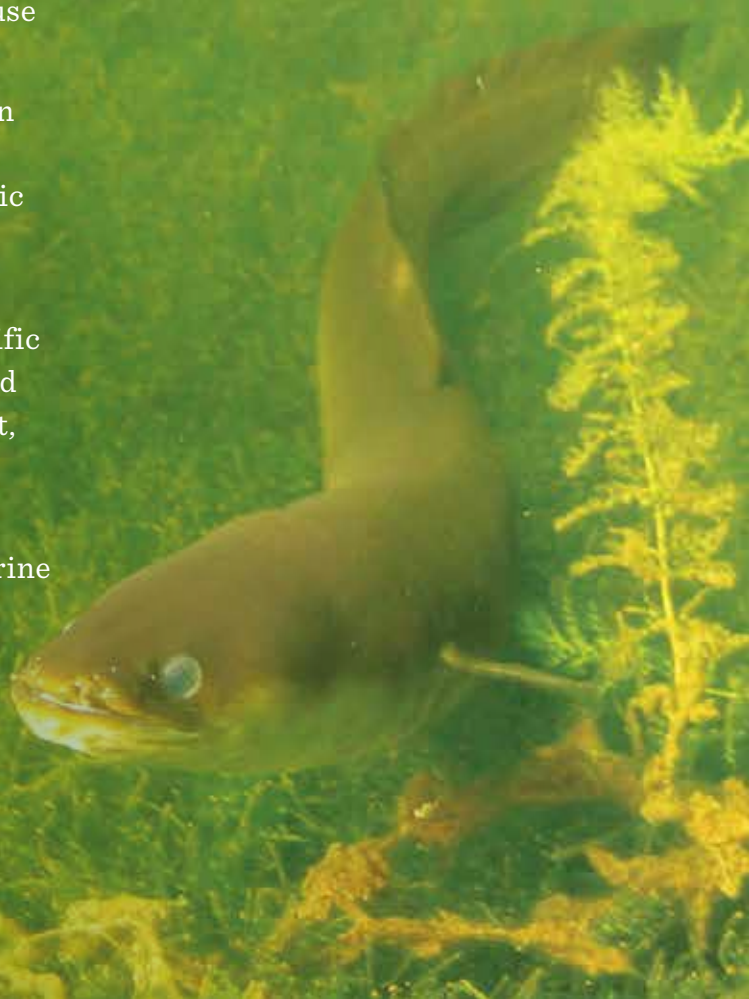
*Dave Hansford*

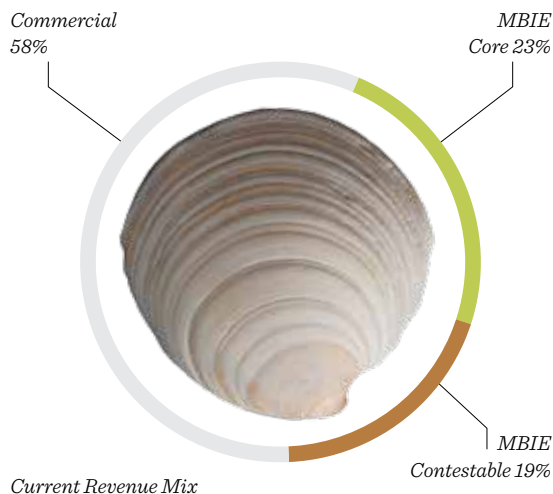


# TE KŪWAHA

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management and use of aquatic resources
- ▶ Grow renewable energy production through developing a greater understanding of renewable aquatic and atmospheric energy resources
- ▶ Increase the resilience of New Zealand and South-West Pacific islands to tsunami and weather and climate hazards, including drought, floods and sea-level change
- ▶ Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity.





The asset base of enterprises in the Māori economy totals at least \$37 billion, approximately doubling in the past 5 years. Investment is focused in the export sectors of seafood, forestry and farming but return on assets is, overall, low<sup>6</sup>. Treaty settlements are more formally recognising the environmental stewardship role of iwi, and restoration of aquatic environments is often a key form of redress included in the settlements. Effort within this Centre is aimed primarily at the transfer of NIWA's knowledge developed in other Centres to Māori entities in a manner that encourages uptake and adoption for economic, social and environmental benefit. Success is dependent on science programmes in the other Centres being appropriately planned to address the needs of Māori. This is a key role of Te Kūwaha.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**Enhance the economic, social, and environmental outcomes of Māori for the benefit of all New Zealanders.**

NIWA will invest c. \$2.5M of its Core Funding over the next 5 years to help support activities in this Centre, but delivery of the science programmes described below will be reliant on relevant research being conducted in the other Centres and on revenue from other sources, including Māori business enterprises.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

- ▶ Develop tools for the management and restoration of aquatic taonga species (Core Funding 2013/14 of \$0.20M)
- ▶ Develop knowledge and tools that support increased investment and returns from the Māori economy (Core Funding 2013/14 of \$0.20M).

In addition, \$0.10M of Core Funding will be used to support specific sector engagement and promotional activities.

<sup>6</sup> Source: Treasury economic outlook December 2012.taskforce/met-rep-assetbaseindepend-2011.pdf\* [http://www.tpk.govt.nz/\\_documents/taskforce/met-rep-assetbaseindepend-2011.pdf](http://www.tpk.govt.nz/_documents/taskforce/met-rep-assetbaseindepend-2011.pdf)

## Relevance to Stakeholders

- ▶ Māori have significant investments in the primary sector, most of which are climate- and weather-sensitive industries. There is significant opportunity to enhance returns from these assets through better utilisation of NIWA's data and forecasting capabilities
- ▶ Māori fishing companies control approximately 37% of New Zealand's domestic fishing quota and are a significant investor in aquaculture. Knowledge developed in our Fisheries and Aquaculture Centres will help these entities diversify and reach their growth potential
- ▶ Co-governance and co-management of water between iwi/Māori and the Crown poses challenges in bringing together differing viewpoints on the use of this natural asset. Science can play an important role in defining the status of waters and providing rehabilitation options that are supported by iwi and the wider community
- ▶ Government's Vision Mātauranga policy, which supports: (1) Taiao – helping Māori communities to achieve environmental sustainability by strengthening iwi and hapū relationships with land and sea resources and their role in kaitiakitanga; (2) Hauora/Oranga – addressing a distinctive challenge for Māori communities that contributes to health and social wellbeing; and (3) Mātauranga – bridging the interface between indigenous knowledge and scientific knowledge.

## Key Science Collaborations

- ▶ Māori researchers in other CRIs, universities, consultancies and iwi authorities. Skills are thinly-spread and forming 'best teams' is important to ensure quality research that enhances uptake and adoption
- ▶ Scientists within NIWA whose primary research may be focused in other National Centres. These scientists provide the underlying scientific knowledge used by this Centre to develop appropriately tailored tools for Māori communities and businesses
- ▶ International collaborations where these provide best practice examples of economic and social benefits to indigenous peoples from the transfer and uptake of science.

## Knowledge and Technology Transfer/Commercialisation

- ▶ In partnership with Māori fishing companies, iwi and hapū, assist in the development of an integrated approach to the management of Māori commercial and non-commercial fisheries interests
- ▶ Engage with Māori entities seeking to invest in new ventures arising from our aquaculture R&D, explaining the opportunity and risks
- ▶ Engage with Māori land-based businesses to trial the application of climate, weather and water information in their operations and demonstrate benefits to farm profitability
- ▶ Help Māori to prepare rohe-specific research strategies that will provide the information needed to protect and enhance their values and aspirations for aquatic ecosystems and associated taonga species
- ▶ Engage in community-based aquatic restoration projects, transferring scientific knowledge and tools to other participants and monitoring the projects' success.

### Impact Measures

1. Māori businesses show increased profitability and return on assets as a result of seizing new opportunities provided by our science
2. Aquatic resource management is enhanced through the full participation of Māori, and degraded waters (and associated taonga) show recovery.

### Key Performance Indicators

1. Complete development of toolkits for monitoring river and estuarine values and train kaitiaki groups in their use by July 2014
2. Complete surveys of two customary fishery areas (e.g., Mātaitai) and use data to develop customary harvest plans in collaboration with iwi by July 2015
3. Successful implementation of research/tools that improve productivity for two large entities within the Māori primary sector by July 2016
4. Complete at least two joint studies with iwi on restoration of aquatic taonga species by July 2017
5. Assist in the establishment of a Māori aquaculture business utilising our R&D by July 2018.



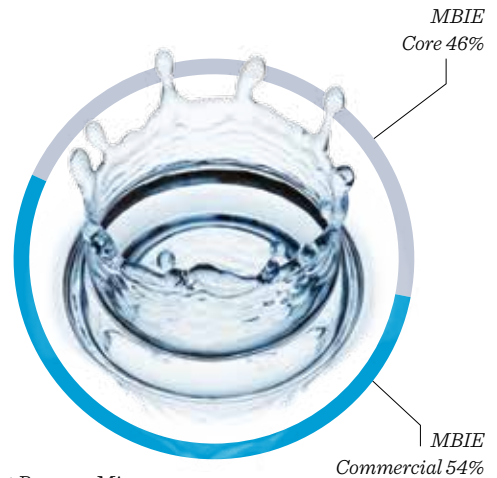
*Dave Allen*



# ENVIRONMENTAL INFORMATION

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management of aquatic resources
- ▶ Grow renewable energy production through developing a greater understanding of renewable aquatic and atmospheric energy resources
- ▶ 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
- ▶ Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity.



New Zealand's economy is founded on weather- and climate-sensitive primary industries, our freshwater is one of our most valuable natural assets, and our marine and freshwater biological communities show a high level of endemism. Recent reviews of New Zealand's aquatic data have highlighted the need for improvements in quality assurance, spatial coverage, innovation in data collection and dissemination, and integration of monitoring networks. Science in this centre seeks to provide proven examples of best practice for environmental monitoring, management, analysis, and delivery tools for uptake by resource managers and natural resource-based industries.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**Environmental data and information are collected, stored, processed and disseminated through innovative, integrated and robust systems so that environmental state and trend reporting, resource use, business decisions, and responses to environmental hazards are improved.**

NIWA plans to invest c. \$32M of its Core Funding over the next 5 years to assist delivery of the science programmes described below. NIWA's monitoring capabilities, collections and databases are well-established, but improvements are required to meet the growing expectations of stakeholders (access to anything, anywhere, anytime). It is anticipated that key industry sectors will increasingly invest in NIWA's capabilities as the benefits of real-time environmental data in improving business efficiency and lowering risk are increasingly demonstrated. Capital investment over the next 5 years will be targeted towards improving climate observing networks, data capture and information delivery.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Environmental monitoring: Develop innovative environmental monitoring technologies, demonstrate these through benchmark sites, and work with other agencies to ensure consistent and robust environmental monitoring across New Zealand (Core Funding 2013/14 of \$4.81M)
2. Information management: Implement and maintain robust information infrastructures to provide future-proof archives for New Zealand's climate, freshwater, marine and biological information (Core Funding 2013/14 of \$1.1M)
3. Information delivery: Develop state-of-the-art, user-centric delivery services that enable information access and re-use for improved resource management and business decisions (Core Funding 2013/14 of \$0.3M).

In addition, \$0.13M of Core Funding will be used to support specific sector engagement and promotional activities.

## Relevance to Stakeholders

- ▶ Various industries (e.g., energy, agriculture, horticulture, viticulture and mining) increasingly use and require up-to-date, easily accessible, quality-assured environmental data to assist in their day-to-day decision making and their longer term planning. There is a need to improve information consistency and delivery to serve those needs
- ▶ New Zealand's State of Environment (SoE) reporting and production of national environmental statistics on a regular basis require environmental data that are consistently collected and well archived
- ▶ An expectation in the digital age is that information is accessible on an 'anywhere, anytime' basis and environmental information is no different. Only well-managed data can be made accessible in useful ways
- ▶ Scientists and environmental managers work increasingly cross-disciplinary and want to access and combine data and information from outside of their specific field of interest. Integrated information management is required to connect and access cross-disciplinary information
- ▶ NIWA is the custodian of significant collections and databases, including the following heritage assets – Marine Benthic Biology Collection, National Climate Database, Water Resources Archive Database, and New Zealand Freshwater Fish Database. There is a continuing need to maintain those databases and make them accessible for re-use.

## Key Science Collaborations

- ▶ Ministry for the Environment, Land Information New Zealand and regional councils as partners for improving consistency in environmental monitoring and information management practice across New Zealand
- ▶ International organisations for developing and adopting international environmental monitoring protocols, integrating New Zealand with global environmental data networks and adopting international interoperability standards for environmental information
- ▶ Te Papa and Landcare Research to develop and improve New Zealand's collections and digital archives for biological specimens
- ▶ Partnering with other CRIs to make our science information delivery more relevant to the primary production sector.

## Knowledge and Technology Transfer/ Commercialisation

- ▶ Develop new flexible and user-centric service delivery systems that provide businesses with environmental data to enable them to make key operational decisions
- ▶ Partner with government agencies to improve national-scale environmental monitoring
- ▶ Maintain databases for climate, water resources, water quality, freshwater and marine biota and improve their accessibility
- ▶ Develop integrated environmental monitoring systems using modern high-quality sensors, loggers, telemetry and web-enabled control systems for application by end users
- ▶ Develop and publish NIWA's monitoring, sampling, and quality assurance protocols, in cooperation with relevant stakeholders (regional councils and others)
- ▶ Develop and conduct training programmes in environmental monitoring in cooperation with relevant stakeholders (regional councils and others)
- ▶ Link NIWA data catalogues and databases with archives and services developed by other organisations into federated systems, thereby allowing rapid and integrated discovery of New Zealand's environmental information
- ▶ Develop and adopt modern information transfer standards in cooperation with other agencies.



### Impact Measures

1. Reporting of the state and trends in the nation's atmosphere, climate, freshwater, and marine systems and biota is more consistent and supported by national standards and qualification frameworks
2. New Zealand fulfils its international environmental reporting obligations and is seen as a leading nation in environmental monitoring
3. Climate- and weather-sensitive industries are more profitable and resilient through greater use of environmental data to make better decisions.

### Key Performance Indicators

1. Reviews of NIWA's hydrometric and water-quality networks have been completed and rationalised with those of other agencies by July 2014
2. NIWA's climate station network is reviewed and key gaps are filled by July 2014
3. NIWA standard operating procedures and quality assurance protocols for its major atmospheric, climate, freshwater, oceanic and biological monitoring and sampling operations are up-to-date, documented and accessible to relevant stakeholders by July 2015
4. 'Weakly managed information' (science data not captured by national databases) is documented in the NIWA data catalogue. By July 2016, 80% of all information generated in science projects is discoverable through the data catalogue.



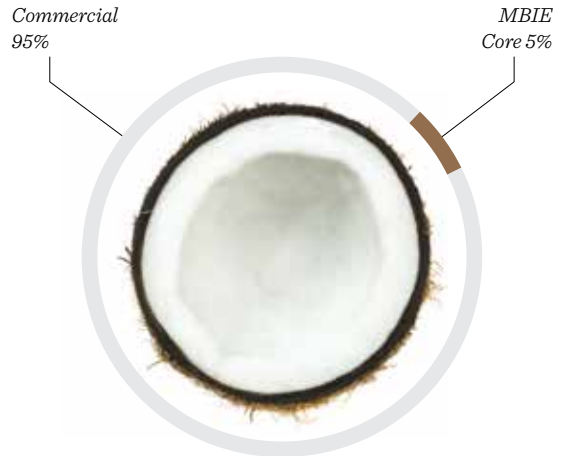
*Dave Allen*



# PACIFIC RIM

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management and use of aquatic resources
- ▶ Grow renewable energy production through developing a greater understanding of renewable aquatic and atmospheric energy resources
- ▶ Increase the resilience of New Zealand's and South-West Pacific islands to tsunami and weather and climate hazards, including drought, flood and sea-level change.



*Current Revenue Mix*

The Pacific region faces ever-increasing environmental challenges, especially in relation to food and water security. There is an urgent need to advance sustainable management of marine and freshwater resources, reduce community and economic vulnerability to natural hazards, and adapt to the impacts that climate change will increasingly cause.

#### **National Benefit and Investment**

This Centre will contribute to the following national benefit:

New Zealand has contributed to the capacity of the Asia-Pacific region to sustainably manage natural resources and prepare for and respond to natural disasters.

NIWA will invest c. \$1M of its Core Funding over the next 5 years to advance our knowledge transfer and relationship-building in the Asia-Pacific region. The majority of revenue required to implement this strategy will be derived from international aid and development agencies.

During 2013/14 NIWA will utilise these revenue sources to undertake the following science programme:

- ▶ Provide scientific advice and build local capacity in the Asia-Pacific region to support environmental, infrastructure and economic decision making and development (Core Funding 2013/14 of \$0.18M).

## Relevance to Stakeholders

- ▶ Development assistance in the Asia-Pacific region is continuing to increase, with an increased focus on development effectiveness and aid efficiency, but there continues to be variable and limited in-country technical and absorptive capacity
- ▶ The European Union, Australia, Asian Development Bank, World Bank, and UN agencies are significant funders. There is an increasing emphasis on activities with tangible outcomes, and an on-going focus on areas that align with New Zealand's development aid objectives
- ▶ New Zealand's international development assistance (through the Ministry of Foreign Affairs International Development Group – MFAT-IDG) is focused on the Pacific countries, specifically Cook Islands, Niue, Tokelau, Samoa, Tonga, Papua New Guinea, Solomon Islands, Vanuatu, Tuvalu, Kiribati and Fiji, with Indonesia, Timor-Leste, Vietnam, Philippines, Cambodia and Lao PDR of key interest in SE Asia
- ▶ Growing New Zealand's international effectiveness through science diplomacy and the development of bilateral scientific collaboration with Europe and the US
- ▶ Regional agencies in the Pacific are increasingly realising the value of technical advice from NIWA to support the development of proposals for global funding initiatives, and technical support in implementation
- ▶ Opportunities to realise deepsea mineral resources in the Pacific region, prompting the issue of prospecting licences in Papua New Guinea, Fiji and Tonga.

## Key Science Collaborations

- ▶ Secretariat of the Pacific Community and Secretariat of the Pacific Regional Environment Programme to advance environmental management initiatives
- ▶ New Caledonian and French research institutes to complement NIWA expertise in climate, marine geology and hazards, wastewater treatment and marine biodiversity
- ▶ Bureau of Meteorology (Australia), CSIRO (Australia), Meteo France and NOAA (US) to advance climate and climate-change initiatives in the Pacific
- ▶ University of the South Pacific to build new science capacity in the Pacific
- ▶ Key Pacific government departments and agencies responsible for environmental management
- ▶ New Zealand government departments involved in State Sector Development Projects in the Pacific (e.g., Ministry for Primary Industries, Department of Conservation)
- ▶ Other CRIs, environmental and engineering consultancy organisations and key non-governmental organisations active in the Pacific.

## Knowledge and Technology Transfer/ Commercialisation

- ▶ Continue to provide environmental information and tools in the Pacific region through working in collaboration with both regional and government staff
- ▶ Contribute to key science and applied science forums, meetings and conferences in the Pacific region
- ▶ Train, mentor and host short-term secondments of key regional and government staff from Pacific countries to build local capacity
- ▶ Provide technical support and advice to MFAT-IDG and other regional and donor staff, particularly United Nations Development Programme and World Bank Pacific offices.

### Impact Measures

1. New Zealand's science-based activities and initiatives in the Pacific Rim have helped to lift economic performance and reduced the impacts of climate- and weather-driven hazards
2. New Zealand's foreign affairs relationships in the Pacific Rim have been enhanced as a result of increased collaborative science in the region.

### Key Performance Indicators

1. NIWA is represented and attends at least eight key regional meetings in the Asia-Pacific region to develop networks, identify assistance opportunities and facilitate implementation of work programmes, and advance New Zealand's international reputation by July 2014
2. Continued involvement in National Adaptation Programme of Action implementation projects in at least three countries by July 2014
3. New scientific collaboration is established with two Pacific countries that focus on wastewater treatment and biodiversity, biosecurity and aquaculture by the end of 2013
4. Develop business propositions for waste-to-energy or wetland treatment installations for key sectors in each of Asia, Australia and the Pacific by December 2013
5. Develop at least two Pacific-based science initiatives with US/Australian/French science organisations, or the University of the South Pacific by July 2014
6. Develop at least one Pacific-focused collaboration with Pacific-based organisations by July 2014
7. RiskScape has been implemented and used to guide risk reduction in a Pacific nation by July 2015.



Julie Hall



# VESSELS

Science within this Centre addresses the following Outcomes in NIWA's Statement of Core Purpose:

- ▶ Increase economic growth through the sustainable management and use of aquatic resources
- ▶ Enhance the stewardship of New Zealand's freshwater and marine ecosystems and biodiversity
- ▶ Increase understanding of the Antarctic and Southern Ocean climate, cryosphere, ocean and ecosystems and their longer-term impact on New Zealand.

New Zealand's area of marine responsibility, the Exclusive Economic Zone, Legal Continental Shelf, Ross Dependency, and hydrographic surveying and search and rescue region, represent over 8% of the Earth's surface. The provision of dedicated research and surveying vessels enables New Zealand to not only fulfil international obligations associated with its large areas of marine sovereignty, but also increase economic returns from existing and potential ocean resources.

### National Benefit and Investment

This Centre will contribute to the following national benefit:

**New Zealand advances the knowledge, exploration, development and management of its oceans and resources through efficient operation of dedicated research vessels.**

NIWA owns and operates three purpose-built research vessels, *Tangaroa*, *Kaharoa* and *Ikatere*, which provide the principal platforms for marine-based research and surveying in New Zealand by NIWA and others. NIWA invested \$26M into the installation of dynamic positioning and system upgrades of *Tangaroa* between 2009 and 2011. These improvements have broadened the vessel's capability and are expected to extend its useful life by another 19 years. Revenue to support the vessels is received from the Ministry of Business, Innovation & Employment, Ministry for Primary Industries (fisheries surveys), Land Information New Zealand (hydrographic surveys), other research providers and the private sector (e.g., minerals exploration companies). All of these sources of revenue are needed to maintain the viability of the vessels' operations.

During 2013/14 NIWA will continue to ensure:

1. Provision of dedicated research vessels to support New Zealand's ocean-based research and surveying, from the coastal margin to the deep sea
2. Efficient and cost-effective operation of the vessels through improved planning and a more unified national approach to ocean research and surveying, including the establishment of a new dedicated marine survey programme
3. Continued upgrading and improvement of the vessels to ensure that they meet both the current and future ocean research and survey needs of New Zealand
4. Health and Safety standards exceed international best practice.

### Relevance to Stakeholders

- ▶ Access to cost-effective vessel platforms will encourage and facilitate industry exploration and investment into exploitation of ocean-based oil, gas and mineral resources
- ▶ The growing conflict between the multiple users of coastal and oceanic regions and the need for the collection of fundamental survey information to inform current management and future policy development
- ▶ The need to collect information critical to New Zealand's international obligations (e.g., United Nations Law of the Sea) and hazard mitigation (e.g., hydrographic charting)
- ▶ Specially equipped vessels are required for the collection of information required to manage or mitigate the important influence the ocean has on New Zealand's industries (e.g., fisheries and aquaculture) and infrastructure (e.g., climate, earthquakes, tsunami, cable networks).

### Key Science Collaborations

- ▶ Key Crown customers, especially the Ministry for Primary Industries (fisheries), Land Information New Zealand (hydrographic surveying), Ministry of Business, Innovation & Employment and New Zealand Petroleum and Minerals, to ensure that vessel-based activities are financially sustainable, cost-effective and efficient
- ▶ Marine-based industries to provide cost-effective vessel platforms that will promote and grow use and economic return from marine resources
- ▶ Antarctica New Zealand to ensure that New Zealand maintains a cost-effective Southern Ocean-Antarctic ocean-going research platform.

### Impact Measures

1. Exploration activity within the New Zealand EEZ has been enhanced through the provision of *Tangaroa*
2. New Zealand is able to meet its international obligations associated with the governance of its maritime region and resources through the research and surveying services provided by NIWA's vessels.

### Key Performance Indicators

1. Annual scientific voyages conducted on the vessels are on time and within specifications
2. Key government agencies have worked in partnership with NIWA to develop a strategy that will ensure efficient use and maximum utilisation of *Tangaroa*
3. Marine-based industries are using NIWA's vessels to explore ocean resources within the New Zealand Exclusive Economic Zone
4. Annual utilisation of *Tangaroa*, *Kaharoa* and *Ikatere* meets budget.



# Q

How are NIWA's vessels helping to enhance the benefit of New Zealand's marine resources?

A: NIWA owns and operates three purpose-built research vessels – *Tangaroa*, *Kaharoa* and *Ikateri* – which provide the principal platform for our marine-based research and surveying, from the coastal margin to the deep oceans. These vessels help New Zealand fulfil international obligations associated with our large areas of marine sovereignty – including our Exclusive Economic Zone, Legal Continental Shelf and the Ross Dependency – and increase economic returns from existing and potential marine resources. Research includes fisheries surveys, hydrographic surveys and commercial work for the oil and gas and mineral exploration sector.



## PERFORMANCE MEASURES

NIWA will measure its performance against the outcomes and operating principles in the Statement of Core Purpose. In addition, NIWA will report on non-financial and financial monitoring indicators required by the Ministry of Business, Innovation & Employment.

### **Key performance measures will include:**

- ▶ Percentage of Key Performance Indicators contained within each Science Centre Plan that are achieved to expected quality and deadline. Reported and reviewed annually
- ▶ Narrative on progress towards achieving Impact Measures contained within Science Centre Plans. Reported and reviewed annually
- ▶ Percentage of Key Actions contained within our Operational Plan that are achieved. Reported and reviewed annually
- ▶ Achievement of the Key Performance Indicators in the financial budget, as listed in the table on the right.

## Financial Performance Measures

Measure	Description	Calculation	Measurement Timeframe
Revenue	Revenue from the operations of the business. Interest revenue is excluded.	Revenue	Quarterly
Current ratio	The ratio of current assets to current liabilities.	Current assets/Current liabilities	Annual
Quick ratio	Adjusted ratio of current assets to current liabilities, adjusted for assets that cannot be liquidated quickly and liabilities that do not require cash to settle.	Current assets less inventory less prepayments/Current liabilities less revenue received in advance.	Quarterly
Adjusted return on equity	Return on equity after removing the impact of fair value movements.	NPAT excluding fair value movements (net of tax)/Average of share capital plus retained earnings.	Quarterly
Return on assets	The efficiency and profitability of a company's assets.	EBIT adjusted for IFRS fair value movements/Average total assets	Annual
Operating profit margin	The profitability of the company per dollar of revenue.	EBITDAF/Revenue	Annual
Gearing	The extent to which a company is funded by debt.	Financial debt/Financial debt and equity	Annual
Interest cover	The number of times the company can cover interest expense with profit.	EBITDAF/Interest paid.	Quarterly
Profit volatility	The standard deviation of the past 5 years' profit, scaled by average profit.	Standard deviation of EBITDAF for past 5 years/Average EBITDAF for the past 5 years.	Annual
Forecasting risk	The average difference between forecast return on equity and actual return on equity for the past 5 years.	5-year average of return on equity less forecast return on equity.	Annual
Capital renewal	Measure of the level of capital investment being made by the company.	Capital expenditure/Depreciation expense plus amortisation expense.	Quarterly

## Non-financial and financial indicators required by the Ministry of Business, Innovation & Employment

### End-User Collaboration

CRI's are expected to develop strong, long-term partnerships with industry, government and Māori, and to work with them to set research priorities that are well linked to the needs and potential of their end users (generic operating principle in the SCP).

- ▶ Percentage and number of relevant funding partners and other end users that have a high level of confidence in the CRI's ability to set research priorities, and the effectiveness of the collaboration or partnership (survey data). Annually
- ▶ Total dollar value of revenue (in cash and in-kind), and dollar value subcontracted out to other organisations from each 'source category' per annum from rolling five years (administrative data). Quarterly
- ▶ Research collaboration – CRI's are expected to develop collaborative relationships with other CRI's, universities and other research institutions within New Zealand and internationally to form the best teams to deliver the CRI's core purpose (generic operating principle in SCP). Annually
- ▶ Percentage of relevant national and international research providers that have a high level of confidence in the CRI's ability to form the best teams to deliver on the CRI's outcomes (survey data). Annually
- ▶ Number and percentage of joint scientific peer-reviewed publications and IP outputs with other New Zealand or international research institutions per annum (administrative data). Quarterly

### Technology and Knowledge Transfer (Science Relevance)

CRI's are expected to transfer technology and knowledge from domestic and international sources to New Zealand industry, government and Māori (generic operating principle in the SCP).

- ▶ Total number and percentage of licensing deals of CRI-derived IP (including technologies, products and services) with New Zealand and international partners per annum (administrative data). Quarterly
- ▶ Percentage of relevant end-users who have adopted knowledge and/or technology from CRI's (survey data). Annually
- ▶ Percentage change in the number of requests and enquiries for the CRI's publicly available collections (administrative data). Quarterly

### Science Quality

CRI's are expected to pursue excellence in all their activities (CRI Act).

- ▶ Total number of international awards, invitations to participate on international committees, and editorial boards for the CRI's published papers, per annum. Annually
- ▶ Average number of citations per CRI published paper. Quarterly
- ▶ Proportion of published papers in the top 25 international journals relevant to the scope of the CRI (as outlined in the SCP) per annum. Annually

### Core Financial Indicators

CRI's are expected to focus on financial viability.

- ▶ Projected cashflow – the measure of forward looking. Quarterly
- ▶ Operating margin – the profitability of the company per dollar of revenue. Quarterly
- ▶ Profit per FTE – the ability of the company to generate a return from its staff. Quarterly
- ▶ Revenue growth – the measure of whether the company is growing revenue. Quarterly

*Note: MBIE will administer and fund the rolling survey that underpins a number of the above indicators. The survey will be developed in partnership with the Crown Research Institutes and interested government agencies.*

# Q

## How does NIWA measure performance against its core purpose?

A: NIWA's Statement of Core Purpose sets out our operating principles and six key outcomes. We have a set of measures to monitor our performance – both financial and non-financial – against our core purpose. They include the achievement of Key Performance Indicators in each Science Centre; Key Actions in the Operational Plan; Key Performance Indicators in our financial budget; our end-user collaboration with industry, government and Māori; technology and knowledge transfer; and, of course, the quality of our science.

## FINANCIALS

Whilst we expect expenditure on science and associated services by our major public sector clients to remain constrained for the foreseeable future, we have nevertheless developed a 5 year financial plan that includes steady revenue growth and continuing tight control on operating costs.

The budgeted NIWA Group revenue for 2013/14 is \$124.04M, with total costs of \$117.29M, creating an operating surplus before tax (EBIT) of \$6.75M and an adjusted return on equity of 6.2%. We are budgeting for the adjusted return on equity to rise to 8.8% in 2017/18. NIWA will continue to have strong cash flows, with an EBITDAF of \$20.01M in 2013/14.

### Revenue

In 2013/14 NIWA Group revenue is budgeted at \$124.04M, in line with the forecast in last year's SCI. Despite the continuing tight fiscal environment and associated reductions in public sector spending that will limit revenue growth opportunities we are forecasting revenue growth for the ensuing 4 years. Achieving budgeted revenue growth will require NIWA's flagship vessel, *Tangaroa*, to be highly utilised and NIWA to develop new revenue opportunities from the private sector.

### Operating Expenditure

In line with revenue, operating expenses are budgeted to increase slightly from \$114.26M in 2012/13 to \$117.29M in 2013/14. Beyond 2013/14 we have budgeted that our total operating expenditure will cost, on average, an additional 1.7% per annum. We have assumed our internal operating environment will remain at the status quo, with staff levels expected to remain similar to 2013/14 starting numbers and the operating-cost efficiency gains of recent years to be maintained.

### Balance Sheet Management

NIWA's science is capital intensive and requires an on-going investment in scientific equipment if we are to secure revenue and be financially sustainable. Capital expenditure over the 5 year outlook of this SCI is budgeted at 10-11% of revenue. The capital renewal ratio is forecast to rise from 100% in 2012/13 to 114% by 2017/18, reflecting a decline in depreciation during the period.

### Cash Flow

NIWA continues to have strong operating cash flows with EBITDAF rising from \$20.01M in 2013/14 to \$23.92M in 2017/18. Based on the present forecast and budget projections, NIWA will return to positive cash balances by early 2013/14.

### Dividend

Subject to achieving its budgets and having no alternative use for the funds, NIWA will be in the financial position to have available for distribution to the Shareholder a \$1M dividend in 2013/14 with \$4M provided for each year thereafter.

### Adjusted Return on Equity

NIWA's budgeted adjusted return on equity in 2013/14 is 6.2%. The production of strong operating cash flows allows NIWA to pay dividends in future years, enabling a reduction in the equity balance. Under such a scenario, NIWA's adjusted return on equity will steadily rise and is budgeted to be 8.8% in 2017/18.

### Risks

More than 75% of NIWA's revenue is presently sourced from central and local government agencies and we have budgeted for declining or static revenues from these customers. The assumption in our revenue budgets is that the private sector will have an appetite for greater investment in science to drive their business forward. Securing such revenue is challenging in the present economic climate and there is downside risk associated with our revenue budgets. Recognising these risks against the background environment, NIWA is confident that its plans remain robust in the near-term to potential negative volatility. We will actively monitor and respond to any emerging risks.

## NIWA GROUP – RATIOS AND STATISTICS

Statement of Corporate Intent	Forecast 2012/13	SCI 2013/14	SCI 2014/15	SCI 2015/16	SCI 2016/17	SCI 2017/18
<b>Revenue (\$M)</b>	120.36	124.04	126.56	129.54	132.72	136.23
<b>Operating Results</b>						
Operating expenses & depreciation	114.26	117.29	119.15	121.18	123.29	125.47
EBITDAF	19.09	20.01	20.56	21.49	22.56	23.92
EBIT & dividend received	6.10	6.75	7.41	8.36	9.43	10.76
Profit before income tax	5.64	6.71	7.49	8.45	9.53	10.88
Profit after tax	4.05	4.83	5.39	6.08	6.86	7.83
Average total assets	135.37	134.03	137.87	140.47	143.88	148.25
Average equity (Shareholders' funds)	96.01	100.28	104.55	106.29	108.76	112.10
Adjusted average total assets*	108.13	106.80	110.63	113.23	116.64	121.01
Adjusted average equity*	73.15	77.42	81.69	83.42	85.89	89.24
Capital expenditure (incl Capital committed)	12.15	12.36	12.54	14.17	14.56	15.00
Capital expenditure % to Revenue	10.1%	10.0%	9.9%	10.9%	11.0%	11.0%
<b>Liquidity</b>						
Current ratio	100.7%	129.9%	136.5%	139.2%	142.9%	148.2%
Quick ratio (aka Acid test)	1.22	1.76	1.85	1.89	1.93	2.00
<b>Profitability</b>						
Adjusted return on equity*	5.5%	6.2%	6.6%	7.3%	8.0%	8.8%
Return on equity	4.2%	4.8%	5.2%	5.7%	6.3%	7.0%
Return on assets	4.5%	5.0%	5.4%	6.0%	6.6%	7.3%
EBIT margin (aka Operating profit margin)	5.1%	5.4%	5.9%	6.5%	7.1%	7.9%
<b>Operational Risk</b>						
Profit volatility	14.5%	12.2%	6.9%	4.5%	5.8%	6.5%
Forecasting risk (non-adjusted ROE)	2.5%	2.3%				
<b>Coverage</b>						
Interest cover	13.0	119.9				
<b>Growth/Investment</b>						
Capital renewal	100.1%	93.2%	95.4%	107.9%	110.8%	114.0%
Funds available for distribution (\$M)	0.0	1.0	4.0	4.0	4.0	4.0
<b>Financial Strength</b>						
Gearing	1.7%					
Equity ratio (aka Proprietorship)	70.9%	74.8%	75.8%	75.7%	75.6%	75.6%
Cash and short-term deposits	0.00	4.93	5.48	6.36	7.30	8.71
Financial debt	1.74	0.00	0.00	0.00	0.00	0.00

\* Agreed with Officials after adjustment in 2006/07 for restatement of certain land and buildings cost figures

Key: ■ Statement of Corporate Intent indicators

## Information to be reported to Shareholders

NIWA will provide information that meets the requirements of the:

- ▶ Crown Research Institutes Act 1992 (the Act);
- ▶ Companies Act 1993;
- ▶ Financial Reporting Act 1993;
- ▶ Crown Entities Act 2004; and
- ▶ New Zealand Institute of Chartered Accountants (NZICA) with regards to Generally Accepted Accounting Practice (GAAP).

The following information is made available to enable our shareholders to make an informed assessment of NIWA's performance:

- ▶ A Statement of Corporate Intent (SCI) which sets out NIWA's strategy for delivering against its core purpose and the company's financial and non-financial performance targets. The draft SCI is due not later than 1 month before the start of the financial year (31 May)
- ▶ An Annual Report containing sufficient information to allow an informed assessment to be made against the performance targets in the SCI. This report includes comments on our core business and how we communicate our science, financial statements (including audit report), and a report from the Directors to the shareholders. The Annual Report is to be provided within three months of the financial year ended 30 June. A public Annual General Meeting is to be held no later than six months after balance date and not later than 15 months after the previous AGM
- ▶ A Half-Yearly Report containing unaudited financial statements (including comparatives of the same period in the previous year) and major highlights during the period. The Half-Yearly Report is due within two months of the first half of each financial year ended 31 December
- ▶ A Quarterly Report containing information such as unaudited financial statements (including current quarter and year-to-date budgets and a forecast for the financial year ended 30 June). The Quarterly Report also includes financial performance measures and progress towards meeting non-financial performance targets. The Quarterly Report is currently requested within one month of each financial quarter ended 30 September, 31 December, 31 March, and 30 June
- ▶ Any other information relating to the affairs of the company, as reasonably required by shareholders, under section 20 of the Act and section 45B of the Public Finance Act 1989.



## POLICY AND PROCEDURE STATEMENTS

### NIWA Group consists of:

- ▶ National Institute of Water and Atmospheric Research Ltd
- ▶ NIWA Vessel Management Ltd
- ▶ NIWA Australia Pty Ltd
- ▶ NIWA Environmental Research Institute
- ▶ NIWA Natural Solutions Ltd
- ▶ EcoConnect Ltd
- ▶ Unidata Pty Ltd.

All companies have 100% ownership and voting interests, except Unidata Pty Ltd which has 80% ownership and voting interest. NIWA Group will adhere to two following procedures, as required to be discussed under section 16 of the Crown Research Institutes Act.

### Accounting Policies

NIWA adopts generally accepted accounting practice in New Zealand as prescribed by the Institute of Chartered Accountants of New Zealand. The accounting policies for the measurement and reporting of financial performance, movements in equity, financial position, and cash flows are detailed in Appendix 1.

### Dividend Policy

Profit retention and dividend distribution will be determined from year to year by the Board. The policy's objective is to ensure that an appropriate level of funds is maintained in the company to sustain financial viability, whilst providing an adequate return to the shareholders. In considering this objective, the Board each year determines the level of surplus funds by reference to NIWA's:

- ▶ medium- and long-term capital investment requirements (including equity investments)
- ▶ ability to maintain and expand operational capability
- ▶ ability to repay debt (if any)
- ▶ funding requirements for subsidiaries
- ▶ capacity to fund RV *Tangaroa*
- ▶ working capital requirements
- ▶ legislative requirements, e.g., ensuring section 4 of the Companies Act 1993 (Solvency test) has been satisfied.

Any dividend would be paid within two months of the financial year-end. NIWA is forecasting to pay a \$1M dividend in 2013/14.

### Shareholder Consent for Significant Transactions

The Board will obtain prior written consent for any transaction or series of transactions involving full or partial acquisition, disposal, or modification of property (buildings, land, and capital equipment) and other assets with a value equivalent to or greater than \$10M or 20% of the company's total assets (prior to the transaction), whichever is the lesser.

The Board will obtain the prior written consent of Shareholding Ministers for any transaction or series of transactions with a value equivalent to or greater than \$5M or 30% of the company's total assets (prior to the transaction):

- ▶ the acquisition, disposal, or modification in a joint venture, partnership, or other similar association
- ▶ the acquisition or disposal in full or in part of shares or interests in external companies, subsidiaries, and business units
- ▶ transactions that affect the company's ownership of a subsidiary or a subsidiary's ownership of another equity
- ▶ other transactions that fall outside the scope of the definition of the company's core business or may have a material effect on the company's science capabilities.

The Board will advise the Shareholding Ministers in writing (in the Quarterly Report) before entering into any transaction below this threshold related to property or to a specific commercialisation venture which involves change in intellectual property ownership or control.

### Ratio of Shareholders' Funds to Total Assets

The target ratio of shareholder funds to total assets is as follows:

#### As at 30 June

	2013 Forecast	2014 Plan	2015 Plan	2016 Plan	2017 Plan	2018 Plan
%	70.8	74.8	75.8	75.7	75.6	75.6

Shareholders' funds are defined as the sum of the share capital and equity reserves (otherwise called total equity).

Total assets are defined as the sum of the net book value of current and non-current assets. This is as disclosed in the company's balance sheet as per the Annual Report, prepared in accordance with the accounting policies adopted by the Board.

Shareholders' funds and total assets are averaged over two years.

### Commercial Value of the Shareholders' Investment

Section 16(3) of the Act requires the NIWA Group to furnish an estimate of the current commercial value of the Crown's investment.

The NIWA Board is satisfied that the net asset position (or shareholders' funds) as at 30 June 2012 is a fair and reasonable indication of the commercial value of the Group. The net asset position as shown in accordance with the company's accounting policies for 30 June 2012 was \$95.8 million.

### Activities where Shareholder Compensation would be required

The Board would look to seek compensation from the shareholders in the following circumstances:

- ▶ Where the shareholders instruct NIWA to undertake activities or assume obligations that would result in a reduction of the company's profit or net realisable value
- ▶ Where the Board may consider undertaking strategic investments for the wider benefit of the New Zealand public, involving financial outlays beyond those incorporated within the company's Statement of Corporate Intent or financing capabilities.

No request for compensation is currently being sought from the shareholders. At this time no such investment has been identified, nor have any financial projections for such investment been included in NIWA's 2013/14 Statement of Corporate Intent.

### Other Matters Specifically Requested by the Shareholders

There are no other matters that have been specifically requested by the shareholders.

The following information can be found on NIWA's website:

- ▶ Personnel policy that complies with the principles of a good employer
- ▶ Equal Employment Opportunities programme
- ▶ Corporate Social Responsibility policy.



Chris Mace  
Chair



Craig Ellison  
Director



## APPENDIX I: DETAILED 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).

### 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 and functional currency 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.

### 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.

### 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 loses control of a subsidiary, the profit or loss on disposal is calculated as the difference between:

- ▶ the aggregate of the fair value of the consideration received and the fair value of any retained interest; and
- ▶ 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.

#### 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.

#### 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 requisition 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 is 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 shareholder's 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.

## **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 the 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 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
- ▶ 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 & leasehold improvements

Buildings	40 years
Leasehold improvements, freehold property	10 years
Leasehold improvements, rented property	5–12 years

##### Vessels

RV <i>Tangaroa</i> hull	31 years
RV <i>Kaharoa</i> hull	16 years
RV <i>Ikateri</i> hull	20 years

##### Plant & equipment

Plant & equipment	10 years
Scientific equipment	8 years

##### Electronic data processing equipment

Supercomputer	8 years
Electronic data processing equipment	3 years
Office equipment	5 years
Furniture & fittings	10 years
Motor vehicles	6 years
Small boats	10 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

#### Transactions

Transactions in foreign currencies are converted to the functional currency of 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.

#### 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.

Goodwill and fair value adjustment arising on the acquisition of a foreign operation are treated as assets and liabilities of the foreign operations and translated at the exchange rate ruling at balance date.

### p) Leases

Leases are classified as finance leases whenever the terms of the lease transfer substantially of 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 money market, net of outstanding bank drafts.

### 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.

#### Other financial assets

Non-derivative financial assets comprise receivables, cash and cash equivalents, un invoiced 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 cashflows, 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.



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## APPENDIX 2: ADVISORY PANELS

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This Statement of Corporate Intent has been prepared with input from the NIWA Board and staff and external organisations and individuals including members of our advisory panels listed below.

### Advisory Panels to the Board

#### Science Advisory Panel

- ▶ Dr Rob Vertessy – Deputy Director (Water), Bureau of Meteorology, Australia
- ▶ Dr Bruce Mapstone – Chief, CSIRO Marine and Atmosphere Research, Australia
- ▶ Professor Peter Hunter – Director, Auckland Bioengineering Institute, University of Auckland

#### Stakeholder Advisory Panel

- ▶ Tim Lusk – Professional Director
- ▶ David Carter – Managing Director, Beca Corporate
- ▶ Parekawhia McLean – CEO, Waikato-Tainui Administration

### Centre Stakeholder Panels

#### Aquaculture

- ▶ Colin Johnston – Technical Director, Aquaculture New Zealand
- ▶ Mark Gillard – Operations & Contracts Manager, NZ King Salmon
- ▶ Dan Lees – Director Aquaculture Unit, Ministry for Primary Industries
- ▶ Harry Mikaere – Board Member, Aquaculture New Zealand

#### Fisheries

- ▶ Scott Gallacher – Deputy Director-General, Resource Management and Programmes, Ministry for Primary Industries
- ▶ Greg Johansson – General Manager Operations, Sanford
- ▶ Craig Lawson – General Manager Policy & Operations, Te Ohu Kaimoana
- ▶ David Middleton – Chief Scientist, Seafood Industry Council of New Zealand

#### Coasts and Oceans

- ▶ Martin Cryer – Science Manager Aquatic Environment, Ministry for Primary Industries
- ▶ Geoff Hicks – Chief Scientist, Department of Conservation
- ▶ Chris Baker – Chief Executive, Straterra
- ▶ Peter Singleton – Scientist, Resource Information Group, Waikato Regional Council
- ▶ Naomi Parker – Manager Science Policy, Ministry for Primary Industries

#### Freshwater and Estuaries

- ▶ Christina Robb – Programme Director Water and Land, Environment Canterbury
- ▶ Grant Barnes – Manager Research, Investigation and Monitoring, Auckland Council
- ▶ Sheila Watson – Operations Manager, Meridian Energy
- ▶ Vera Power – Manager Science and Evaluation, Ministry for the Environment
- ▶ Rosemary Miller – Freshwater Manager, Department of Conservation
- ▶ Alastair Bisley – Chair, Land and Water Forum

#### Hazards

Stakeholder advice is provided through the multi-agency Natural Hazards Research Platform, led by GNS Science.

#### Atmosphere and Climate

- ▶ \*Stuart Calman – Director Climate Policy, Ministry for Primary Industries
- ▶ Frances Sullivan – Senior Policy Analyst, Local Government New Zealand
- ▶ Gerald Rys – Senior Scientist, Ministry for Primary Industries
- ▶ Professor David Karoly – Faculty of Science, University of Melbourne
- ▶ Dr Ed Butler – Manager Antarctic Science, Antarctica New Zealand

#### Te Kūwaha

- ▶ Ben Dalton – Deputy Director Māori Primary Sector Partnerships, Ministry for Primary Industries
- ▶ \*Traci Houpapa – Chairperson, Federation of Māori Authorities
- ▶ Roku Mihiniui – Chief Executive Officer, Te Arawa Lakes Trust
- ▶ Maria Pera – Chair Treaty Tribes, Te Rūnanga o Ngāi Tahu

#### Environmental Information

- ▶ \*Kevin Sweeney – Geospatial Custodian, Geospatial Office, Land Information New Zealand
- ▶ Ken Taylor – Director, Investigations and Monitoring, Environment Canterbury
- ▶ Norm Thornley – Senior Geospatial Analyst (Manager Information Management), Department of Conservation
- ▶ Wayne Bird – Geospatial Information Systems Manager, Transpower

#### Vessels

- ▶ James Stevenson-Wallace – Director Fisheries Management, Ministry for Primary Industries
- ▶ David Binnie – General Manager, New Zealand Petroleum & Minerals
- ▶ Lou Sanson – Chief Executive, Antarctica New Zealand
- ▶ Richard O'Reilly – Manager Land Policy Team, Land Information New Zealand

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\*Resigned

## APPENDIX 3: NIWA'S ORGANISATIONAL RESPONSIBILITY CHARTER

NIWA is committed to contributing positively to the social, economic and environmental wellbeing of New Zealand:

### Economic

NIWA is committed to operating with fiscal discipline to ensure that we retain our long-term viability and meet our core purpose science responsibilities to generate sustainable economic benefit to New Zealand.

We are committed to:

- ▶ fair trading and observing high standards of behaviour, integrity and ethics
- ▶ maintaining positive relationships with our customers, partners and collaborators
- ▶ taking a broad approach to decision making and business development with the aim of benefitting all of New Zealand.

### Social

NIWA is committed to work practices, operations and science outcomes that support our staff and the wider community.

We are committed to:

- ▶ ensuring that people are safe in our workplaces and subject to zero harm
- ▶ engaging positively with the communities in which we operate and live
- ▶ respecting cultural values and diversity in New Zealand and in the countries where we work
- ▶ fostering positive interactions with, and outcomes for, Māori.

### Environmental

NIWA is committed to operating in an environmentally responsible way when carrying out our activities, and ensuring that we meet our core purpose science responsibilities to contribute to better environmental outcomes for New Zealand.

We are committed to:

- ▶ minimising the environmental effects of performing our business
- ▶ integrating environmental perspectives into our wider business planning
- ▶ complying with all regulatory requirements, standards and best practice guidelines.

### Operating to our Charter Principles

We must ensure that the commitments we give are owned by all our people and demonstrated by their actions.

### Economic

We will support the Organisational Responsibility Charter by:

- ▶ being fair and honest in all our business dealings
- ▶ maintaining objectivity in our service provision and avoiding actions that could damage NIWA's reputation for impartiality
- ▶ taking a 'NZ Inc' approach to business decisions and using any market advantage responsibly

- ▶ delivering on our project commitments – on time, to budget and with the expected quality
- ▶ employing our assets responsibly both to benefit the company and the wider community
- ▶ abiding by the laws of the lands in which we operate
- ▶ resolving differences without the need for litigation.

### Social

We will support the Organisational Responsibility Charter by:

- ▶ being a good employer, particularly in relation to;
  - providing equitable access to employment opportunities
  - leadership, accountability and culture
  - recruitment, selection and induction
  - employee development, promotion and exit
  - flexibility and work design
  - remuneration, recognition and conditions
  - harassment and bullying prevention
- ▶ treating our employees and all others with whom we interact with dignity and respect, including fostering long-term relationships built on trust and mutual benefits
- ▶ ensuring staff have opportunities to participate in work-place improvement programmes
- ▶ making available best practice systems and training to achieve zero harm to any individual in our work places
- ▶ empowering our employees to identify and resolve safety concerns so that potential hazards are eliminated and safe processes and work methods are under continual improvement
- ▶ maintaining open communication with local communities and ensuring our activities and staff respect their traditions and cultures
- ▶ supporting our employees to participate in voluntary activities that benefit the wider community
- ▶ working closely with individual employees to help them reach their goals and provide NIWA with talent for the future
- ▶ striving for 'no surprises' in our internal and external relationships.

### Environmental

We will support the Organisational Responsibility Charter by:

- ▶ ensuring that all our activities and assets comply with resource consents, relevant environmental standards, biosecurity and biodiversity regulations, and permitting requirements
- ▶ maintaining full compliance with animal ethics procedures and ensuring that all sampling and work with live animals complies with the Animal Welfare Act 1999
- ▶ minimising material waste and resource use, and making maximum practical use of recycling and electronic media
- ▶ minimising energy consumption and greenhouse gas emissions, within the constraints of business sustainability
- ▶ supporting our employees to take positive actions to reduce the effects of their activities on the environment at work and beyond.

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## APPENDIX 4: DATA MANAGEMENT AND ACCESS POLICY

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NIWA is committed to the development of robust information infrastructure for the management, stewardship and accessibility of its research data and information. This includes:

- ▶ procedures and systems for the capture, quality assurance, storage, back-up and curation of data and information that conform with national and international standards and best practice
- ▶ protection of personal, confidential or third party data and information
- ▶ open transfer web services for the discovery, display and access of data and information, consistent with those specified in the New Zealand Interoperability Framework
- ▶ licence agreements to maximise access and re-use of data and information, based on the New Zealand Government Open Access and Licensing Framework
- ▶ free public access to data and information, or pricing as appropriate to cover the costs of dissemination and contribute to the costs of curation
- ▶ continuous improvement to accommodate technological advances and ensure long-term custodianship and access of data and information.

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## DIRECTORY

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### Board of Directors

Chris Mace (Chairman)  
Craig Ellison (Deputy Chairman)  
Dr Helen Anderson  
Professor Keith Hunter  
Ed Johnson  
Helen Robinson  
Jason Shoebridge

### Executive Team

John Morgan (Chief Executive Officer)  
Geoff Baird (General Manager Communications & Marketing)  
Dr Barry Biggs (General Manager Operations)  
Dr Bryce Cooper (General Manager Strategy)  
Dr Mary-Anne Dehar (General Manager Human Resources)  
Arian de Wit (General Manager Information Technology)  
Dr Rob Murdoch (General Manager Research)  
Michael Parrott (Chief Financial Officer & Company Secretary)

### Solicitors

Bell Gully  
Atkins Holm Joseph Majurey Ltd

### Auditors

Deloitte on behalf of the Auditor-General

### Bankers

ANZ National Bank of NZ Ltd

### Insurance Broker

Marsh Ltd

### Registered Office

41 Market Place  
Auckland Central 1010  
New Zealand  
Private Bag 99 940  
Newmarket  
Auckland 1149  
New Zealand

### Website

[www.niwa.co.nz](http://www.niwa.co.nz)







