

Statement of Corporate Intent 2015/16

HIGHER

Climate & Atmosphere

CLEARER

Freshwater

DEEPER

Coasts & Oceans

Enhancing the benefits of New Zealand's natural resources

HIGHER represents our greater understanding of what's happening in the atmosphere, and the higher precision we're achieving with our environmental forecasting services.

CLEARER represents our ability to provide science to achieve the nation's aspiration for clearer water, and a clearer understanding of our customers' needs, so our science can add value to their activities.

DEEPER represents our ability to reach deeper into our oceans to understand the rich resources of our marine estate, and deeper under the seabed to identify the fault lines of the geological threats we are exposed to.





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NIWA's flagship research vessel Tangaroa eases past ice-cloaked Sturge Island, in the Balleny Islands group, during the 2015 international expedition to the Southern Ocean and Antarctica.



CHAIRMAN AND CHIEF EXECUTIVE'S OVERVIEW

We are pleased to present NIWA's Statement of Corporate Intent (SCI) for 2015–2020, describing our strategy for meeting the obligations specified in our Statement of Core Purpose. It illustrates a continuation of our plans for delivering science of national benefit, refreshed to reflect changes in our operating environment, and forecasts a sustainable financial performance based on current revenue projections.

Dimensions

NIWA is New Zealand's largest and pre-eminent provider of climate and atmosphere, freshwater and ocean science. In this SCI we describe how our 620 staff and \$138M of assets will be deployed to deliver the outcomes expected by our shareholders and stakeholders – namely, science that supports New Zealand's economic growth, enhances human well-being and safety, and enables good stewardship of the country's natural resources and biodiversity.

Context

During the 5-year period of this SCI we expect the nation's need for our science will grow. Debates on the use of New Zealand's natural resources to drive economic growth within socially-accepted environmental limits will intensify. Such debates will need to be well-founded in science, and the policy and planning decisions that emerge will need a sound evidential base. The science described in this SCI encompasses both cause and effect relationships to help establish those environmental limits and solution-focused research to help sectors thrive within those limits. Through the strategy process used in developing this SCI, surface water–groundwater interactions and marine surveys were two priority areas stakeholders identified where increased investment over the next 3 to 5 years is required, and this has been provided for. In addition to conducting science in a manner that makes it 'decision-ready', we need to communicate it well, such that uncertainties and decision risks are understood.

National Science Challenges

NIWA will be the host for the *Sustainable Seas* and *Deep South* National Science Challenges and will be significant contributors to three other National Science Challenges: *Our Land and Water*, *Resilience to Nature's Challenges* and *New Zealand's Biological Heritage*. These mission-led Challenges provide an important opportunity for the science community to add further value to New Zealand, and NIWA is committed to their success.

Core Funding

Core Funding is a critical mechanism that enables our science to be aligned to both the National Science Challenges and other areas within our core purpose. This SCI assumes Core Funding to NIWA remains at current levels and sees stability in our allocation of Core Funding across our science areas, except for some shift to areas highlighted by stakeholders

during our strategy development process. During the period of this SCI we will continue to review our Core Funding allocation to ensure it remains relevant to both the near-term and longer-term needs of our stakeholders.

Capability and Assets

NIWA's ongoing investments in science capability and assets are necessary for it to remain well-positioned as New Zealand's predominant provider of climate and atmosphere, freshwater and ocean science. The actions described in this SCI are designed to ensure we maintain a high-performing workforce with skills that are aligned to our science strategy, supported by ongoing investment in scientific equipment, information technology, operational systems and physical infrastructure. In particular, this SCI signals a need for NIWA to undertake significant capital investments during the coming 5 years in respect of its property assets and its high performance computing facilities. These investments in national capability and assets can occur only if NIWA is successful in securing funding within an increasingly competitive science system.

Collaborations

We cannot deliver outcomes on our own. The breadth and depth of the science we do, and the widespread communities that could potentially benefit, mean that collaborations are essential. Consequently, collaboration with other science providers, nationally and internationally, is required to ensure we assemble the 'best teams' in our core science areas. These collaborations will need to be further strengthened as we address the National Science Challenges. Strategic partnerships with stakeholders are also important to ensure effective application of our science. We have many strong and valued connections within the sectors we serve and we intend to nurture and grow them, so that our science is well used and used well. A significant focus will be partnering with Māori enterprise to add value in areas of our expertise.

Financial sustainability

In 2015/16, NIWA's revenue is budgeted to be \$137.04M, with earnings before interest and tax of \$5.05M and an adjusted return on equity of 4.5%. NIWA will seek to have steady operating cash flows over the period of this SCI while undertaking a significant programme of investment in the capital needs of the business. There is forecasting uncertainty associated with NIWA's revenue budget assumptions, in particular related to the National Science Challenges, revenue associated with the RV *Tangaroa*, contestable funding and Core Funding.

In summary, the plans described in this Statement of Corporate Intent will ensure NIWA is in a strong position to deliver on its shareholders' and stakeholders' expectations.



Chris Mace
Chairman



John Morgan
Chief Executive

NIWA's high-resolution weather forecasting capabilities are helping New Zealand farmers make better operational decisions, leading to improved productivity and reduced environmental impacts.

ACCURATE WEATHER FORECASTING FOR IMPROVED FARM DECISIONS



1 OPERATING ENVIRONMENT

This SCI has been prepared within the following context:

- ▶ The shareholders' expectation that investment in science must be relevant to stakeholder need and contribute to New Zealand's economic, social, cultural and environmental prosperity. There are emerging opportunities and challenges for New Zealand's use of its natural capital that will increasingly demand the application of NIWA's science.
- ▶ The increasing role of Māori in the management and economic use of natural resources.
- ▶ Changes to the science system, including the implementation of the National Science Challenges.
- ▶ Assumptions regarding shareholder commitment to the ongoing use and maintenance of New Zealand's specialist science capability residing in NIWA.
- ▶ The constrained fiscal environment in which NIWA will operate.

1.1 Relevance to New Zealand's needs

Regular engagement with our stakeholders has given clear signals on the priority issues and opportunities they have and where NIWA's scientific resources can be best applied to add most value. The key theme that emerges is the need for more science to underpin the use of New Zealand's natural resources for economic growth within socially-accepted environmental limits.

Primary Sector – Land-based

The government's Business Growth Agenda recognises that the future of New Zealand's export-based economy is heavily reliant on growth of the rural sector, and that such growth must occur within the environmental limits expected by New Zealanders. NIWA will continue to help the sector address this challenge by conducting applied science that:

- ▶ Develops new technologies and methods to minimise the transfer of contaminants from land to water.
- ▶ Improves the accuracy of climate forecasts, so the sector can better plan and prepare to maximise returns and minimise risks.
- ▶ Provides accurate, real-time, and fine-scale weather data and forecasts, so on-farm operational decisions can be made that maximise returns and reduce risks to both farm assets (property, livestock and crops) and the environment (e.g., nutrient runoff).
- ▶ Develops intelligent control systems for land managers, so production is enhanced, water is used efficiently and nutrient losses are reduced.

Primary Sector – Seafood

Sector and government strategies for the growth of New Zealand's seafood industry recognise the need to maximise returns from a sustainably-managed wild fishery and to increase the production, diversity and environmental performance of aquaculture. NIWA will continue to help the sector meet its strategic goals by conducting applied science that:

- ▶ Provides independent and robust assessments of fish stocks in support of the Quota Management System and New Zealand's international fisheries obligations.
- ▶ Determines fishing and aquaculture practices that have low environmental footprints.
- ▶ Discovers and helps commercialise new opportunities for species diversification, in both wild catch and aquaculture.

Central Government

Government is the primary investor in science on behalf of the nation through the Ministry of Business, Innovation & Employment, and expects scientific knowledge to inform policy, legislation and regulation, provide input into long-term strategies and underpin the operational needs of ministries and departments. NIWA will continue to meet these needs through being competitive and cost effective, building partnerships with key government agencies and undertaking fundamental and applied science that:

- ▶ Delivers the capabilities required to meet operational research needs, especially in fisheries stock assessment and management, marine and freshwater biosecurity surveillance, incursion response and pest management, and marine and freshwater surveying.
- ▶ Enables participation in strategy initiatives, in particular those associated with water management (the Land and Water Forum), future marine resource development and management, building national resilience to natural hazards, responding to climate impacts, advancing opportunities for Māori, and re-use of environmental data.
- ▶ Builds our ability to represent New Zealand's international interests on behalf of the Crown, especially through science diplomacy (e.g., with the US, China, and South Korea); membership of international scientific bodies, initiatives and programmes; services to Pacific Island nations; and contributing to the needs and obligations of the Antarctic Treaty and other international agreements.
- ▶ Provides the evidence base and information to inform the development of environmental policy and regulations, especially in relation to climate, natural resource use and development, environmental management and conservation and natural hazards.
- ▶ Provides access to national data and information, based on whole of government approaches and standards, which enables their re-use by others and meets national need (e.g., environmental reporting and statistics).

Local Government

The sector requires that its environmental policies and plans have a sound evidence base during their development, and must provide proven methods for their implementation, which still enable regional economies to thrive. NIWA will continue to help this sector address these policy priorities by conducting applied science that:

- ▶ Provides technical tools for establishing water quantity and quality targets and limits as they seek to implement the National Policy Statement on Freshwater Management.
- ▶ Develops greater understanding of the drivers and influences on freshwater, estuarine and coastal ecosystems, so policies and plans can be effectively targeted.
- ▶ Develops new methods for monitoring the environment which are robust, cost-effective and enable the effectiveness of policies to be determined.
- ▶ Predicts the impacts of climate change (including sea-level rise) on regional economies and infrastructure.
- ▶ Provides operational weather-related hazard warning systems (e.g., floods, storm surge).

Oil, Gas and Mineral Exploration

New Zealand's maritime region contains vast natural capital, particularly in the form of oil, gas, and mineral resources. Realising the economic potential of the marine estate is constrained by the uncertainty brought into resource decision-making processes by the comparative lack of knowledge of the undersea environment and what the impacts of exploitation might be. Utilising its vessel *Tangaroa*, NIWA will continue to help this sector by conducting applied science that:

- ▶ Provides information on key seafloor regions with high potential for oil, gas and mineral exploration.
- ▶ Determines the distribution and characteristics of marine biological communities, their vulnerability to seafloor mining activities and their capacity for recovery from disturbance.
- ▶ Provides the evidence base for the sector and government agencies to discuss the development and implementation of environmental guidelines, policies and regulations.

Infrastructure

The National Infrastructure Plan recognises the importance to New Zealand's economic growth plans of greater investment in electricity, water and transport infrastructure. NIWA will continue to help infrastructure providers by conducting applied science that:

- ▶ Assesses hydro and wind energy resources and their reliability.
- ▶ Predicts the impacts of climate variability on the security of water supply for hydropower and irrigation.
- ▶ Determines the environmental impacts of proposed infrastructure developments and how they are best mitigated.
- ▶ Enhances utilisation and risk management of current assets by providing better real-time and forecast information on changes in critical environmental conditions (e.g., sea state, river flows, soil moisture, air temperatures and rainfall).

Pacific Rim

New Zealand's foreign affairs strategy recognises the special relationships we have with the Pacific Islands and the benefits of strengthened relationships with the economies of the wider Asia-Pacific Region. NIWA is aligned with that strategy, conducting applied science that:

- ▶ Develops information, tools and capacity to build predictive capacity, preparedness and resilience to extreme weather events and climate change.
- ▶ Improves economic development through sustainable use of natural resources (particularly freshwater and fisheries).
- ▶ Manages water resources, quality and waste for improved health, water and energy security.

1.2 Implementing the National Science Challenges

Most of the government's National Science Challenges have now been contracted. NIWA has contributed as a collaborative party to the establishment of those Challenges which are closely aligned with its Statement of Core Purpose, and is the contracting entity for two of the Challenges, with the responsibilities that entails. Over the period of this SCI, NIWA will continue its strong commitment to, and support for, the Challenges. This will be achieved through alignment of our strategies, planning, activities and resources to the research priorities of these Challenges as appropriate, to ensure that the outcomes expected from the Challenges are delivered. Our specific contributions to the Challenges will be to:

- ▶ Host the *Deep South* and *Sustainable Seas* Challenges on behalf of our collaborators, with a focus on ensuring good governance and cost-effective administration, responsible financial management, building national 'best teams' of researchers to deliver the mission of the Challenges, development of transparent and robust processes for setting research priorities and allocating Challenge funds, meeting the needs and aspirations of Māori through incorporation of Vision Mātauranga, and engaging with stakeholders and communities.
- ▶ Provide significant support and expertise as a collaborative party to *Our Land and Water, Resilience to Nature's Challenges* and *New Zealand's Biological Heritage* to help advance the development of these Challenges.
- ▶ Maintain and/or build the staff capability and science infrastructure required to support the research and associated activities of the Challenges with which NIWA is aligned, to the extent funding success allows. This will be especially important in the areas of climate and atmosphere, freshwater, and ocean research, where NIWA is the predominant national provider of expertise.
- ▶ Align Core Funding projects (\$11.53M per annum, 27% of Core Funding) with the research priorities of the Challenges, to ensure they build on and complement Challenge-funded projects and contribute to the achievement of the Challenge missions.

- ▶ Where appropriate, use Challenge strategies and investment decisions as an input into NIWA's strategic planning and decision-making processes, especially capital investment considerations and workforce planning.
- ▶ Use our established networks and mechanisms to engage stakeholders in the Challenges, such as priority setting, co-delivery and co-funding, and the transfer and application of research results.
- ▶ Assist with the engagement of Māori within the Challenges, not only iwi but also Māori businesses, to ensure that they both provide benefit to and derive benefit from the research and associated activities of the Challenges.
- ▶ Utilise NIWA's communications expertise and resources to promote and widely publicise to stakeholders, Māori and other communities the benefits and outcomes arising from Challenge research and associated activities.
- ▶ Contribute to the annual reporting of Challenge achievements and key performance indicators.

1.3 Adapting to the fiscal environment

Despite the December 2014 Half Year Economic and Fiscal Update from Treasury forecasting New Zealand's annual economic growth to be between 2.2% and 3.4% over the next 5 years, we expect the spending of our major central and local government clients to remain constrained. We expect some revenue growth in 2015/16 associated with the National Science Challenges, as well as modest incremental growth from private sector and international sources. There are significant risks associated with securing these revenues and those associated with the use of *Tangaroa*.

We have budgeted accordingly, with the period of this SCI reflecting modest top-line growth from \$137.04M in 2015/16 to \$142.25M in 2019/20. Although sub-contracting costs will rise as a result of our hosting two National Science Challenges, other expenditure is planned to remain under tight control. We expect, however, profitability to be constrained due to NIWA's needs to undertake significant strategic investments in capital assets and science capability. Some debt financing will be required to undertake these investments, to be serviced by the steady operating cash flows forecast throughout the period.

NIWA's science underpins collaborative efforts to protect the quality and availability of New Zealand's precious freshwater resources.

PREDICTING THE DYNAMICS OF WATER AVAILABILITY



2 SCIENCE OVERVIEW

NIWA is New Zealand's largest provider of climate and atmosphere, freshwater and ocean science. Approximately half of our effort is in developing new knowledge and the other half is in applying it. NIWA will continue to invest in the scientific expertise and assets required to deliver high quality and relevant science. An overview of the scope of NIWA's science activities and the nature of these investments are described below, with greater detail provided in Appendix 2.

2.1 Coasts & Oceans

NIWA is New Zealand's largest marine science organisation, with c. 508 staff who contribute to the c. \$60M of annual research and applied science services conducted in this area. These experts are supported by the fully-equipped research vessel *Tangaroa*; other smaller vessels; specialist remote, onboard, and at-base analysis equipment; the high performance computing facility and the marine and aquaculture research centre at Bream Bay, Northland. Our marine science includes:

- ▶ Assessing the geological and biological resources of the seafloor.
- ▶ Understanding ocean currents and productivity.
- ▶ Determining the effects of stressors on marine ecosystem resilience and recovery, taking an ecosystem-based approach.
- ▶ Identifying threats from introduced seaweeds and animals, and developing tools to mitigate their impact.
- ▶ Assessing fish stocks and developing ecosystem-based approaches to fisheries management.
- ▶ Determining the impacts of fisheries and aquaculture on marine ecosystems.
- ▶ Developing techniques for the aquaculture of established and emerging finfish and shellfish species.

2.2 Freshwater & Estuaries

NIWA has c. 350 staff who contribute to the c. \$40M of annual research and applied science services conducted in this area. These experts utilise data from NIWA's water monitoring network of 100 sites, as well as from additional data collection campaigns using specialist sampling and analytical equipment. Our freshwater and estuaries science includes:

- ▶ Predicting the dynamics of water availability and the ecosystem limits to allocation.
- ▶ Understanding the interactions between surface water and groundwater, including the pathways for transfer of contaminants.
- ▶ Identifying threats from introduced aquatic plants and animals and developing tools to mitigate their impact.

- ▶ Developing techniques to enhance ecosystem health in response to contaminants and habitat modification.
- ▶ Developing improved operational tools to forecast floods.

2.3 Climate, Atmosphere & Weather (and related Hazards)

NIWA has c. 300 staff who contribute to the c. \$30M of annual research and applied science services in this area. These experts utilise NIWA's high performance computing facility, atmospheric composition sampling and analysis equipment, and NIWA's 200 weather measurement sites across the country. They also participate in extensive global collaborations which enrich New Zealand's science and provide opportunity for adding greater benefit. Our climate, atmosphere and weather science includes:

- ▶ Observing, analysing and modelling the atmosphere and climate of the New Zealand region.
- ▶ Determining the role of oceans in influencing New Zealand's climate.
- ▶ Predicting the effects of climate change and variability on New Zealand and the South-West Pacific.
- ▶ Determining the impacts of air pollutants on human health, and evaluating mitigation options.
- ▶ Predicting and evaluating risks, impacts and potential losses from weather-related hazards.
- ▶ Developing and delivering operational weather and weather-impact forecast models.

2.4 Science Infrastructure

Much of NIWA's science is capital intensive, requiring ongoing investment in equipment, which 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 requiring ongoing investment to maintain and grow New Zealand's capability include:

- ▶ A high performance computing facility used to advance our understanding of the complex physical, chemical and biological components of our atmospheric, climate, weather, freshwater and marine systems. Other New Zealand researchers are able to access the computer's capabilities through the New Zealand eScience Infrastructure (NeSI) collaborative initiative. During the 5 year period of this SCI we will need to review our high performance computing capability and \$15M has been nominally budgeted for an upgrade. When appropriate, a full evaluation of upgrade options, costs, and funding mechanisms will be undertaken and presented to the shareholders.
- ▶ NIWA's highly-equipped research vessels (*Tangaroa*, *Kaharoa* and *Ikateri*), which, along with the skills of NIWA staff and our collaborators, have the capabilities to cost-effectively provide key information on the resources that lie within New Zealand's Exclusive Economic Zone.

This includes surveys of oil, gas and mineral deposits; seafloor biological communities; fisheries; and megafauna. The vessels are available for charter by other research organisations and industry. We will continue to work with key government agencies to develop a revenue strategy that ensures efficient use and maximum utilisation of our vessels into the future.

- ▶ The Bream Bay facility, which is well equipped to be utilised for marine science, including aquaculture research and its commercialisation. The high volumes of good quality seawater and available land mean this site is ideally suited as the base for regional aquaculture development. There is currently a commercial paua farm on site, and over the period of this SCI we expect further commercialisation of our aquaculture R&D to occur to contribute to economic growth and employment in the region.
- ▶ Environmental monitoring networks. NIWA collects and curates observational data on atmospheric constituents, weather and climate variables (>300 sites), and river flows and water quality (>100 sites). These datasets often represent the only long-term, quality assured measurements of New Zealand's climate and water resources and are often used by resource management agencies and weather-dependent industry sectors and their consultants. These collection networks are supported through a range of revenue streams. In response to stakeholder feedback, during 2015/16 we will implement a standardised access and charging policy with the aim of simplifying data transfer and providing financial sustainability for ongoing collection, quality assurance, curation and system upgrades.

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 SCI and result in more efficient use of capital.

2.5 Collaboration

Collaboration with other science and stakeholder organisations, both nationally and internationally, is an important element of NIWA's success and strategy. This enables NIWA to:

- ▶ Undertake the breadth and depth of the science we do.
- ▶ Deliver benefit to widespread communities and sectors.
- ▶ Build the 'best teams' based on multiple disciplines and skills.
- ▶ Leverage the expertise, knowledge and technologies developed by others.
- ▶ Develop the future science capability the nation will need.
- ▶ Ensure that key science assets are used efficiently and effectively.

Details of our collaborations are provided in our science plans in Appendix 2. Collaborations that are particularly important over the period of this SCl include:

- ▶ Central and local government agencies, as they develop and implement policies related to land, water and coastal resources. We have strong relationships with these agencies and will look to nurture and grow these relationships by working together on more projects, being part of working groups and forums, and seeking opportunities for staff secondments.
- ▶ Key business sectors and their peak bodies, as we seek to better understand the issues and opportunities they have in utilising natural resources and work together on solutions and realisation of those opportunities.
- ▶ Māori researchers, tribal authorities and businesses, as we seek to enhance adoption of our science by Māori as they exercise kaitiakitanga and seek greater economic returns from their assets.
- ▶ CRIs, universities, and other research organisations (nationally and internationally), as we deliver on the National Science Challenges we host and participate in.
- ▶ Other global weather research and forecast organisations that participate in the Unified Model Consortium dedicated to improving the accuracy of weather forecasts and climate-change predictions.
- ▶ The New Zealand eScience Infrastructure initiative, which ensures nationally coordinated development of and access to e-science and high performance computing.
- ▶ The New Zealand Association of Science Educators and the Sir Peter Blake Trust, to promote science careers to young people.
- ▶ Joint Graduate Schools between NIWA and the Universities of Auckland and Otago in marine science, and the University of Waikato in freshwater science, to develop future talent.
- ▶ Initiatives in marine and climate science with international organisations through Memorandums of Understanding, especially with the US (National Oceanic and Atmospheric Administration, Woods Hole Oceanographic Institution), Japan (Japan Agency for Ocean-Earth Science and Technology), and China (Institute of Oceanology, Chinese Academy of Sciences).
- ▶ Associate membership of the Australian Antarctic Climate and Ecosystems Cooperative Research Centre, and participation in the Australian Integrated Marine Observing System, to coordinate and advance ocean and atmospheric data collection from the Southern Ocean and Antarctica.
- ▶ Economists and social scientists, as we seek to analyse the full spectrum of economic, social, cultural and environmental effects of natural resource use and provide it in a decision-ready package to communities.

2.6 Communicating our Science

The science we do is important for decisions on how natural resources are managed, and can therefore lead to challenges to the integrity of our science and our scientists from those with an advocacy position. Furthermore, environmental science has uncertainties, and these uncertainties provide opportunities for confusion and misinterpretation. Although NIWA has a very strong brand, based on a reputation for excellent science and impartial advice, this brand is increasingly under threat as debates on natural resource use intensify. Communication of the value of our science must be in such a way that it facilitates uptake, reinforces our position as the authority and demonstrates our impartiality.

Key trends and drivers that change the way we must communicate our science include:

- ▶ Increased interest in, and challenge of, science.
- ▶ A shift away from mainstream media to digital and social networks.
- ▶ Increased speed of public debate on issues, enabled by the internet.
- ▶ Rising expectations that communication will be immediate, available anywhere and anytime, and dynamic and highly visual.

Key actions for 2015/16

NIWA will:

- ▶ Maintain proactive and responsive media engagement.
- ▶ Increase development and use of highly visual, dynamic imagery and innovative technologies to enhance knowledge transfer and stakeholder engagement.
- ▶ Collaborate with other science providers and natural resource sector stakeholders to increase acceptance of the benefits of science and evidence-based decision making.
- ▶ Increase marketing initiatives to clearly define our fundamental role as the lead scientific authority in atmosphere and climate, freshwater and oceans.
- ▶ Develop and continue to support engagement between the National Science Challenges we host and their constituencies.
- ▶ Ensure our website attracts and rewards visitors with continually improved, dynamic and highly visual content which is aligned with our stakeholder and customer engagement and marketing strategies, is a foundation for our science communication and complements other outreach activities.
- ▶ Increase our capabilities in presentation and digital delivery, and develop creative ways of making our science compelling by use of new technologies, recruitment and staff development.

A NIWA diver inspects
Mediterranean fanworm
(*Sabella spallanzanii*)
– a marine pest – in the
Viaduct Harbour Auckland,
during a biosecurity survey.

**ONE NIWA –
PUTTING THE
BEST TEAMS
TOGETHER**



3 EFFICIENT AND EFFECTIVE OPERATIONS

NIWA continues to review and change the way it operates to ensure optimal efficiency and effectiveness. Enhanced operating systems have been put in place to drive time-efficiency. Now the emphasis is on 'living' our organisational values of excellence, safety, people and teamwork, customer focus, integrity and agility.

3.1 Science Delivery

NIWA's science is operationally managed and delivered through 5 main sites and 10 regional sites across New Zealand and 1 in Australia. Our science is organised, resourced and delivered through >1,300 projects/year (with >10,000 tasks) based on a comprehensive project management system which allows appropriate teams to be seamlessly formed from across NIWA ('One NIWA'). More than 70% of NIWA's projects involve collaborations with one or more organisations (c. 30% in New Zealand and c. 45% with international organisations from 21 countries), and 90% of projects are delivered on time and within budget.

Trends and Drivers

Key trends and drivers that change the way we must deliver our science include:

- ▶ The need for increased agility to grasp opportunities and meet individual customer expectations as they work to tighter deadlines.
- ▶ The rapid rise in competition and disruptive technologies.
- ▶ Questions and problems becoming more complex, more important, more multidisciplinary, and larger in scale.
- ▶ Customers wanting to be more involved in projects.
- ▶ A growing need for data re-use due to the cost of new data collection and greater emphasis on understanding long-term environmental variability and change.
- ▶ Much stricter Health and Safety requirements and greater compliance requirements for a range of new regulations.
- ▶ Greater availability of new (often mobile) technologies which can improve productivity and data collection/provision and reduce supply-chain weaknesses.

Our Recent Responses

Over recent years, significant effort has already been made to improve systems, processes and support for our science delivery. These continuous improvements include:

- ▶ Rationalising and simplifying policies, procedures and administration systems, and making them more accessible online.
- ▶ Developing near real-time productivity and project progress reporting.
- ▶ Improving project management skills and support systems.
- ▶ Improving project risk and hazard assessments, increasing personal accountability for maintaining safe work practices, and introducing daily safety checks.
- ▶ Better-focused business risk assessment and controls.
- ▶ Increasing accountability for project delivery (on time, to specification, within budget).
- ▶ Refining and simplifying 'self-service' electronic administrative systems.

Key actions for 2015/16

NIWA will:

- ▶ Develop and implement an improved 'enterprise-wide' information management system.
- ▶ Implement further innovations in data and information delivery processes for our customers, including expanded 24 hour operational systems and real-time self-help to data.
- ▶ Further upgrade our quality management systems to ensure excellence in all that we do.

3.2 Our People

NIWA's success is due in large part to its high calibre workforce. Our science capability extends across a wide breadth of natural resource science areas (climate and atmosphere, freshwater and oceans), and is supported by high quality staff in our support functions. It is a highly educated workforce, internationally diverse and relatively stable – 260 PhD or Masters level staff from 26 countries, with staff turnover at about 7% per annum. NIWA is very active in nurturing the next generation of scientists, supervising up to 80 PhD and Masters level students annually, and supporting and hosting a number of postdoctoral fellows and international placement students.

Trends and Drivers

Key trends and drivers that influence our human resources approaches include:

- ▶ A fast-changing external environment which requires a more dynamic and adaptable approach to managing and deploying staff capability.
- ▶ Growing international demand and competition for environmental and natural resource science knowledge and expertise.
- ▶ Younger generations who expect more rapid growth and career development.

- ▶ Demographic and workforce trends that see staff placing increasing value on workplace flexibility.
- ▶ An ongoing requirement for the support functions to operate as efficiently and effectively as possible.
- ▶ Increasing customer demand for 24/7 services.

Our Recent Responses

In response to these trends and drivers over recent years we have:

- ▶ Embedded a proactive approach to workforce planning, assessing and acting on changes in market demand and strategic direction.
- ▶ Maintained a focus on providing an attractive and competitive remuneration and benefits package.
- ▶ Improved our remuneration structure and provided greater clarity on career progression.
- ▶ Focused more on accelerated development and career advancement of identified high-potential employees.
- ▶ Continued to enhance our student engagement and educational outreach activities.
- ▶ Retained and emphasised the positive elements of workplace flexibility that have been a longstanding feature of NIWA's culture.
- ▶ Continued to foster pan-CRI collaborations on recruitment, HR policies and learning and development opportunities.
- ▶ Explored options for achieving greater flexibility in formal employment agreements.

Key actions for 2015/16

NIWA will:

- ▶ Complete Workforce Planning sessions with each National Centre and support function to assess capability and capacity and maintain the optimal size, skill mix and diversity for the organisation.
- ▶ Complete Individual Development Plans for NIWA's identified pool of Future Leaders to facilitate their accelerated development.
- ▶ Enrol up to eight senior managers in the first pan-CRI Leadership Development programme to be held during the first quarter of the 2015/16 financial year.
- ▶ Select and implement an electronic learning management system to improve delivery of knowledge/compliance-based training for staff.
- ▶ Promote and participate in collaboration and resource sharing across CRIs and the tertiary education sector to add value to our recruitment and staff development needs.
- ▶ Develop further strategies for enhancing student engagement, including trialling a summer internship programme for the November 2015–February 2016 university vacation.
- ▶ Work with staff to achieve greater flexibility in formal employment agreements to enable NIWA to meet changing customer requirements.

3.3 Health and Safety

NIWA's core value of safety commits us to take personal responsibility for the safety of ourselves and others around us at all times. Our ongoing focus is improving the safety performance of all NIWA activity to ensure the prevention of harm to our staff, contractors, suppliers, visitors and research partners.

NIWAsafe is the 2013–2016 strategic pathway towards zero harm. Five targeted areas of improvement define the scope of *NIWAsafe*:

- ▶ Leadership – enhance the safety leadership capability of the organisation.
- ▶ Systems – increase system capability, efficiency and effectiveness.
- ▶ Behaviour – improve understanding of how decision making reduces cognitive error.
- ▶ Preventative Care – prevent occupational disease and muscular skeletal impairment in the workforce.
- ▶ Curative Care – resolve impairment, injury and rehabilitation needs in the workplace.

The nature and extent of NIWA's operational activities involve six critical risk areas that require particular safety management focus. Critical Risk Teams target hazardous substances, fall prevention and confined spaces, electricity and fixed plant, vehicles and moving plant, water activity and crisis management as priority safety improvement areas. For non-critical or everyday risk Regional Safety Teams, with Elected Safety Representatives, monitor and improve safety performance. Oversight of safety performance is the responsibility of the Safety Leadership Team.

Key actions for 2015/16

NIWA will:

- ▶ Review and update NIWA safety and wellbeing guidelines, procedures and programmes, and seek opportunities to work collaboratively with other CRIs to improve capability, efficiency and effectiveness.
- ▶ Improve consistency across NIWA in the application of standards, procedures and guidelines for safety and wellbeing.
- ▶ Consult with staff to align NIWA's Drug and Alcohol policy to client and industry standards through the inclusion of pre-employment, post-incident and reasonable-cause drug and alcohol testing to support a substance impairment-free workplace.
- ▶ Establish a safety leadership process that increases safety performance capability at the regional level.
- ▶ Improve lag and lead indicators in safety performance and use them to target continuous improvement.

3.4 Information Technology

Information Technology (IT) underpins the science and operations of NIWA. It supports the reliable acquisition, safe storage, accurate analysis and sustained delivery of environmental and business information. It enables the modelling and visualisation of a growing range of phenomena at ever finer spatial and temporal scales, can make our science 'come alive', and can provide real-time information on revenues, expenditure and staff utilisation.

In the global science community, the use of eScience continues to build, and NIWA scientists are at the forefront of these developments, dealing with large datasets and modelling complex systems. Important enablers of this research include NIWA's high performance computer and associated storage capacity, New Zealand's high-speed research and education network, and our highly-skilled IT team.

Investments in capital and staff resources for IT are evaluated against six high-level goals:

- ▶ Environmental information and business records are captured, stored, protected, and communicated.
- ▶ Customers can discover, acquire and interact with information and records from NIWA via integrated delivery channels.
- ▶ NIWA staff have the necessary tools, processes and technologies to meet research and business outcomes.
- ▶ Infrastructure, systems and standards deliver a return on investment through gains in operational efficiency and effectiveness.
- ▶ Research into new technologies and solutions enables innovation in science and commercial operations.
- ▶ Technical staff contribute skills and experience to a mix of science projects, organisational improvement projects, and operational support work, prioritised according to NIWA's strategic objectives.

Key actions for 2015/16

NIWA will:

- ▶ Develop and operate a high-availability, robust, core IT and product-delivery infrastructure aligned with the needs of the business and the requirements of customers.
- ▶ Deliver an information and records management system that meets the needs of the business, the Public Records Act and third-party compliance requirements.
- ▶ Develop and operate an IT Risk Management framework, with policies and processes that align resilience and security requirements with the business requirements of agility and flexibility.
- ▶ Invest in training and development across all staff to engender best IT practices in the development and operation of science delivery through technology.
- ▶ Invest in new hardware and software technologies to capture, manage, analyse, visualise and deliver environmental information.

- ▶ Equip staff with up-to-date devices, communications and applications backed with effective training and support.
- ▶ Be an active participant in the National eScience Initiative (NeSI) and other eScience initiatives to enhance national science collaboration and efficient use of IT infrastructure.

3.5 Finance and Administration

NIWA continues its focus on enhancing its finance and administration systems and processes to support frontline staff in their interactions with customers, help manage science projects and provide the data and analysis necessary to manage its business. The implementation and refinement of centralised and automated systems has given frontline staff more agility and made it faster and easier to complete administration tasks under a 'high trust' approach, backed by appropriate and effective controls.

Improved administration platform

In recent years NIWA has moved to a centralised, electronic finance and administration model, and has upgraded its project management system. It has also improved the detail, quality and timeliness of business intelligence for managers, enabling closer monitoring and better informed decision making on projects and operations. The centralised model, combined with intuitive operating systems and processes, has enabled the finance and administration functions to be better, faster, more efficient and more informative.

The focus is now on continuing to optimise the performance of the new tools, and in so doing to improve the visibility of financial information across the organisation. A strategic priority will be to enhance the ability and capacity of the finance and administration team to add value to NIWA through the provision of insightful financial analysis. We will continue to look at ways to simplify processes and increase the level of utilisation of the self-service applications.

Risk management

Early in the 2014/15 year, the NIWA Board approved a Risk Management Framework which brings together existing risk management disciplines and processes within an overarching and coordinated structure. The focus during the 2015/16 year will be on embedding the approach set out in the Framework through the organisation and testing our success in achieving that. This will include a particular focus on risk management within both our science projects and our IT infrastructure, as well as a review of our protective security environment.

Key actions for 2015/16

NIWA will:

- ▶ Expand the business intelligence tool to include financial reporting and cash forecasting, thereby further reducing our reliance on manual processes and spreadsheets.
- ▶ Develop or update (as applicable) the company's finance, procurement, contracts and project management manuals.
- ▶ Develop a strategy to upgrade NIWA's principal sites over a 5–10 year period, ensuring that all locations will be capable of supporting leading edge scientific research for the foreseeable future.
- ▶ Implement a common companywide process for the identification and tracking of business risks.
- ▶ Identify whether any enhancements are needed to the risk identification, assessment and management process in respect of our science projects by conducting an internal audit review.
- ▶ Review NIWA's practices for adherence to the principles embedded within the government's Protective Security Requirements.

*A NIWA marine ecologist
braves sub-zero conditions
to experience a beautiful
sunset at Terra Nova Bay,
Antarctica, during the 2015
research expedition.*





4 ANNUAL PERFORMANCE TARGETS

During 2015/16 NIWA will focus on delivering on the following key initiatives to transfer technology and knowledge that support New Zealand's economic, environmental and social prosperity:

- ▶ Providing the leadership and support to expedite progress with the two National Science Challenges that NIWA is hosting (*Deep South* and *Sustainable Seas*), and actively contributing to three others where NIWA has a key role to play (*Our Land and Water*, *New Zealand's Biological Heritage* and *Resilience to Nature's Challenges*).
- ▶ Contributing to the implementation of the National Freshwater Reforms by supporting the work of the re-formed Land and Water Forum, the government's Natural Resources Group and regional councils as water policy and planning processes are developed and implemented.
- ▶ Contributing to the government's National Environmental Reporting initiative by continuing to operate nationwide observing networks for climate and water quantity and quality, and working with the Ministry for the Environment, Statistics New Zealand and regional councils to improve the coverage and quality of data used for State of Environment reporting.
- ▶ Investing in NIWA's aquaculture capability and working with the aquaculture industry to achieve its growth aspirations, including the commercialisation of new finfish species.
- ▶ Continuing the deployment of NIWA's weather and climate modelling and forecasting capability to weather impacted or dependent sectors and stakeholders.
- ▶ Working with international agencies to improve climate, weather and hazard assessment and prediction in Pacific Island nations.
- ▶ Proactively promoting science to young people through the national secondary school science and technology fairs, collaborating with the Sir Peter Blake Trust, and continuing to collaborate with universities through the supervision of students studying for science qualifications.

NIWA will measure its performance against the outcomes and operating principles in its Statement of Core Purpose using the following set of indicators.

Financial Indicators

Measure	Calculation	Reporting Frequency	Forecast 2014/15	Target 2015/16
Operating margin	Earnings before interest, tax, depreciation, amortisation and fair-value (EBITDAF)/Revenue	Annual	16.4%	15.1%
Profit per FTE	EBITDAF/FTEs	Annual	\$35,000	\$34,000
Quick ratio	Current assets less inventory less prepayments/ Current liabilities less revenue received in advance	Quarterly	1.57	1.93
Interest coverage	EBITDAF/Interest paid	Quarterly	236	Not applicable
Profit volatility	Standard deviation of EBITDAF for past 5 years/ Average EBITDAF for the past 5 years	Annual	7.0%	4.1%
Forecasting risk	5 year average of return on equity less forecast return on equity	Annual	2.0%	2.2%
Adjusted return on equity	NPAT excluding fair value movements (net of tax)/ Average of share capital plus retained earnings	Quarterly	6.1%	4.5%
Revenue growth	% change in revenue	Annual	1.8%	8.3%
Capital renewal	Capital expenditure/Depreciation expense plus amortisation expense	Quarterly	113.5%	122.2%

Organisational Performance Indicators – 2015/16 at a glance

Measure	Calculation	Reporting Frequency	Forecast 2014/15	Target 2015/16
End-user collaboration*	Revenue per FTE from commercial sources	Quarterly	\$100,000	\$100,000
Research collaboration*	Publications with collaborators	Quarterly	73%	75%
Technology and knowledge transfer*	Commercial reports per scientist FTE	Quarterly	0.9	1.0
Science quality*	Impact of scientific publications	Annually	2.5	2.5
Operational efficiency*	Revenue per FTE	Quarterly	\$210,000	\$233,000
Operational delivery	% projects delivered on time	Annually	85%	>90%
Strategic progress – operations	% Operational Plan KPIs achieved	Annually	95%	>90%
Strategic progress – science	% Science Plan KPIs achieved in full	Annually	95%	>90%
Stakeholder engagement*	% stakeholders confident in NIWA's priority setting process	Biennial	69%	>70%

*Ministry of Business, Innovation & Employment generic indicators.

Canterbury's landscape-altering Rangitata South irrigation scheme utilises the world-class expertise of NIWA's freshwater scientists and bespoke water-control technology developed by NIWA's instrument systems engineers.

CONTINUAL INVESTMENT IN STAFF, SCIENTIFIC EQUIPMENT AND FACILITIES



5 FINANCIALS

In recent years NIWA has delivered steady profits and cash flows while continuing to invest in its scientific equipment and facilities, as required to maintain its position at the forefront of natural resources and environmental science in New Zealand. Planning is now underway for a significant capital expenditure programme over the coming years that will address two principal objectives:

- ▶ Upgrading NIWA's high performance computing capability, given that its existing facilities are approaching the end of their design life in 2017/18.
- ▶ Upgrading NIWA's facilities to ensure they are fit for purpose and of a contemporary standard, consistent with the need to attract and retain the best available scientific talent.

Whilst the financial assumptions reflected within this SCI provide for these two capital investment programmes, the amounts included are preliminary and indicative. The accuracy of these estimates will be improved as planning for these programmes progresses over the coming year.

NIWA has also elected to undertake a programme of additional investment in building strategic scientific capability in two areas: surface water–groundwater interaction; and increased marine research utilising NIWA's research vessel *Tangaroa*.

Other than as discussed above, we have assumed only marginal changes to NIWA's current operating environment in developing our financial projections. Core Funding is assumed to remain flat throughout the period of the business plan (continuing its erosion in real terms), and no change is assumed in the current funding arrangements for *Tangaroa*.

The 5 year financial plan reflects modest but steady revenue growth and continuing tight control on operating costs. The budgeted Group revenue for 2015/16 is \$137.04M, with total costs of \$131.99M, creating an operating surplus before tax (EBIT) of \$5.05M and an adjusted return on equity of 4.5%. NIWA expects to continue to deliver steady operating cash flows, with an EBITDAF of \$20.74M in 2015/16, which is forecast to remain at similar levels through the 5 years of this SCI, with a predicted EBITDAF of \$20.79M in 2019/20.

Revenue

In 2015/16 NIWA Group revenue is budgeted at \$137.04M, up by \$11.44M compared with the 2014/15 year, driven by the expected full-scale launch of NIWA's participation in the National Science Challenges. Of these increases, \$7.10M is accounted for by subcontractor costs associated with the National Science Challenges, resulting in underlying net revenue increases for NIWA of \$4.34M compared with the 2014/15 year and \$0.26M compared with last year's SCI. This year's SCI continues the approach of prior years, reflecting an expectation of only limited underlying revenue growth opportunity through the period beyond that associated with the National Science Challenges.

Operating Expenditure

In 2015/16, operating expenses are budgeted at \$131.99M, up from \$119.19M in 2014/15. Of this increase, \$7.10M represents subcontractor costs associated with the National Science Challenges as noted above, resulting in an underlying increase to operating expenses of \$5.7M. This increase relates to underlying personnel and other cost increases as well as to the science capability-building effort discussed above (surface water/groundwater interaction and increased scientists' time on *Tangaroa*).

Beyond 2015/16 we have budgeted that our total operating expenditure will increase, on average, by an additional 0.8% per annum. We have assumed our internal operating environment will remain at current levels, with staff levels expected to achieve full complement by the end of 2015/16 and then remain at similar levels for the years beyond. Operating cost efficiency gains of recent years are expected to be maintained, and we have assumed that inflation will continue at a low level.

Balance Sheet Management

NIWA's science is capital intensive and requires an ongoing investment in scientific equipment if we are to secure revenue and be financially sustainable. Beyond this underlying capital spending requirement, however, the strategic investment requirements discussed above (high performance computing and property) will require significant incremental capital spending during the business plan period. The forecast set out in this SCI contemplates a requirement to spend \$15M on renewing NIWA's high performance computing capability; an estimated \$50M on renovating or replacing the physical infrastructure and facilities at three of the main NIWA sites (Hamilton, Wellington and Christchurch); and continued development at the Northland Marine Research Centre at Bream Bay.

NIWA expects to fund these investment requirements from a combination of its existing resources, operating cash flows, and debt funding.

Cash Flow

NIWA expects its operating cash flow to remain steady, based on current revenue projections, with EBITDAF of \$20.74M in 2015/16 remaining at similar levels through the 5 years of this SCI, with a predicted EBITDAF of \$20.79M in 2019/20. NIWA expects to require debt financing to support its strategic capital investment needs during the second half of the business plan period; such financing being repaid over the following 5 years.

Dividend

Based on the strategic capital investment needs identified above, no dividends are planned during the period of this SCI; however, the NIWA Board will review this on an annual basis.

Adjusted Return on Equity

NIWA's budgeted adjusted return on equity in 2015/16 is 4.5%. This is expected to decline slightly over the period to 3.8% in 2019/20, as depreciation expense increases due to the strategic investments in capital assets discussed above.

Risks

There is forecasting uncertainty associated with NIWA's revenue budgets, in particular related to the National Science Challenges, revenue associated with *Tangaroa*, contestable funding and Core Funding:

- ▶ While we have better clarity regarding National Science Challenges revenue compared with last year's SCI, uncertainty will remain until the planning of the Challenges is completed and the substantive work begins.
- ▶ Uncertainty exists around revenues to support the operation of *Tangaroa*, with respect to both Crown funding and charter revenues secured from commercial sources.
- ▶ In excess of \$10M per annum of NIWA's contestable MBIE research contracts end in 2016, and there is uncertainty about the contestable process in future and our ability to secure revenues in what is likely to be an increasingly competitive process.
- ▶ Growing risk of competition and disruptive technologies eroding capability and therefore future business sustainability.
- ▶ A review of Core Funding is underway; the outcome of which could positively or negatively affect our revenues beyond 2015/16.

NIWA's budgeting has been realistic, and we are of the view that there is equal downside risk and upside opportunity. NIWA is confident that its plans remain robust in the near-term to potential negative volatility, and we will actively monitor and respond to any emerging risks.

NIWA Group Ratios and statistics

Statement of Corporate Intent (\$M)	Forecast 2014/15	SCI 15/16	SCI 16/17	SCI 17/18	SCI 18/19	SCI 19/20
Revenue	125.60	137.04	139.21	140.09	141.27	142.25
Revenue growth	1.8%	8.3%	1.6%	0.6%	0.8%	0.7%
Operating Results						
Operating expenses and depreciation	119.19	131.99	134.81	134.98	136.25	136.67
EBITDAF	20.55	20.74	21.11	21.13	21.05	20.79
EBIT and dividend received	6.41	5.05	4.40	5.12	5.03	5.58
Profit before income tax	6.85	5.20	4.59	5.23	4.73	5.16
Profit after tax	4.93	3.74	3.30	3.76	3.41	3.72
EBITDAF per FTE	0.035	0.034	0.034	0.034	0.034	0.034
Average total assets	137.95	139.70	143.61	147.62	151.64	155.39
Average equity (Shareholders' funds)	104.06	106.35	109.85	113.41	116.99	120.55
Adjusted average total assets*	110.71	112.46	116.37	120.39	124.40	128.15
Adjusted average equity*	81.20	83.49	86.99	90.54	94.13	97.69
Capital expenditure (incl. Capital committed)	16.05	19.17	24.56	40.01	25.26	25.58
Capital expenditure % to Revenue	12.8%	14.0%	17.6%	28.6%	17.9%	18.0%
Liquidity						
Current ratio	137.5%	137.4%	119.6%	42.8%	21.3%	(2.9%)
Quick ratio (aka Acid test)	1.57	1.93	1.58	0.49	0.18	(0.16)
Profitability						
Adjusted return on equity*	6.1%	4.5%	3.8%	4.2%	3.6%	3.8%
Return on equity	4.7%	3.5%	3.0%	3.3%	2.9%	3.0%
Return on assets	4.6%	3.6%	3.1%	3.8%	3.3%	3.6%
EBIT margin (aka Operating profit margin)	5.1%	3.7%	3.2%	3.7%	3.6%	3.9%
Operational Risk						
Profit volatility	7.0%	4.1%	4.3%	2.1%	1.1%	0.8%
Forecasting risk (non-adjusted ROE)	2.0%	2.2%				
Coverage						
Interest cover	236.0				17.04	13.45
Growth/Investment						
Capital renewal	113.5%	122.2%	147.0%	249.9%	157.7%	168.2%
Funds available for distribution (\$M)	4.0	0.0	0.0	0.0	0.0	0.0
Financial Strength						
Gearing						
Equity ratio (aka Proprietorship)	75.4%	76.1%	76.5%	76.8%	77.2%	77.6%
Cash and short-term deposits	10.77	11.24	6.66	(13.56)	(19.42)	(26.07)
Financial debt	0.00	0.00	0.0	13.56	19.42	26.07

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

Key: Statement of Corporate Intent indicators.

6 OTHER MATTERS REQUIRED BY THE CRI ACT 1992

6.1 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 3 months of the financial year ended 30 June. A public Annual General Meeting is to be held no later than 6 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 2 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 1 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.

6.2 Policy and Procedure Statements

NIWA Group consists of:

- ▶ National Institute of Water and Atmospheric Research Ltd
- ▶ NIWA Vessel Management Ltd
- ▶ NIWA Environmental Research Institute
- ▶ NIWA Natural Solutions Ltd
- ▶ NIWA Australia Pty 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 the following procedures, as required to be discussed under section 16 of the Crown Research Institutes Act.

6.2.1 Accounting Policies

NIWA adopts generally accepted accounting practice in New Zealand as prescribed by the External Reporting Board. The accounting policies for the measurement and reporting of financial performance, movements in equity, financial position, and cash flows are detailed in Appendix 3.

6.2.2 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 2 months of the financial year-end.

6.2.3 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 \$5.0M or 30.0% 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.

6.2.4 Ratio of Shareholders' Funds to Total Assets

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

As at 30 June	%
2015 forecast	75.4
2016 plan	76.1
2017 plan	76.5
2018 plan	76.8
2019 plan	77.2
2020 plan	77.6

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 2 years.

6.2.5 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 2014 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 2014 was \$103.6M.

6.2.6 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 2015/16 Statement of Corporate Intent.

6.2.7 Other Matters Specifically Requested by the Shareholders

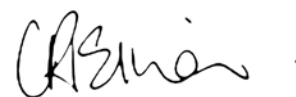
There are no other matters that have been specifically requested by the shareholders.

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
Chairman



Craig Ellison
Director

Giant, tooth-like chunks of ice jostle for position along a walkway near Scott Base, Antarctica. Intensifying research in this remote part of the world is key to understanding the potential impacts on New Zealand of climate variability and change.

INCREASING OUR UNDERSTANDING OF HOW ANTARCTICA AND THE SOUTHERN OCEAN AFFECT NEW ZEALAND'S CLIMATE



APPENDICES

Appendix 1: NIWA's Statement of Core Purpose

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.

Appendix 2: Core Funding Investment and National Centre Plans

2.1 Core Funding Investment

NIWA receives \$42.85M per annum in Core Funding (approximately 30% 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 Advisory Panel.

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

- ▶ The relative potential for economic, social, cultural and environmental benefits from the science proposed. Is the science relevant to government and sector priorities within our core purpose including, as appropriate, alignment with the National Science Challenges and 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 prior 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 re-aligned \$9M of our investment towards those activities targeted at increasing the transfer of science knowledge to end users. In 2015/16, shifts in Core Funding will be small.

Under the Core Funding framework specified by the Ministry of Business, Innovation & Employment, NIWA's Core Funding of \$42.85M will be invested in:

- ▶ Addressing National Science Challenges (\$11.53M).
- ▶ Research and Science Collections & Databases (\$31.32M).

The investment of 2015/16 Core Funding across National Centres is summarised in the table below, along with the profile of investment aligned to the various National Science Challenges. There have been no significant (>10%) shifts in Core Funding between Centres from the previous year's allocations, but small decreases in some Centres and shifts within Centres have been used to increase our investment in climate and atmospheric observing networks and digital delivery of our data and derived products.


Centre	Core Funding (\$M)	Challenge aligned (\$M)	Challenge(s)
Aquaculture	4.84		
Climate & Atmosphere	8.84	1.09	<i>Deep South</i>
Coasts & Oceans	8.80	3.91	<i>Deep South, Sustainable Seas</i>
Environmental Information	6.62		
Fisheries	1.51	0.61	<i>Sustainable Seas</i>
Freshwater & Estuaries	4.05	2.04	<i>Our Land and Water, New Zealand's Biological Heritage</i>
Hazards	4.69	3.88	<i>Resilience to Nature's Challenges</i>
Pacific Rim	0.18		
Te Kūwaha	0.50		
Capability*	2.82		
Total	42.85	11.53	

*Investment in science capability aimed at implementing strategic aspects of our workforce planning including:

- ▶ Targeted research sabbaticals to gain new perspectives in priority areas of 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 international experts to transfer knowledge and skills which advance key areas of science.
- ▶ Supporting staff capability in areas important to delivering on our core purpose, but where other revenue streams have been withdrawn.
- ▶ Strategic investment in staff development and recruitment of new staff (including postdoctorates) in areas of emerging skill shortage, particularly in areas required to meet the needs of the National Science Challenges.

2.2 National Centre Plans

The following pages present the individual plans for each of the National Centres.



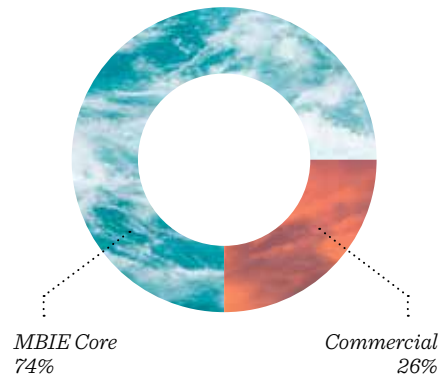
Juvenile hāpuku – a species showing high promise for commercial production via aquaculture following years of research by NIWA specialists at Bream Bay Aquaculture Park near Whangarei.

HELPING INDUSTRY REACH ITS GOAL OF \$1B



Aquaculture

Revenue Mix



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.

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 and barriers to entry 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 both profitable returns and 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-focused 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 will continue to enhance the capabilities of its Northland Aquaculture and Marine Sciences facility and encourage establishment of further commercial ventures. 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 commercialisation.

During 2015/16 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.
2. Develop the underpinning science, monitoring tools and farm management systems that quantify and minimise both the environmental effects and regulatory compliance costs of aquaculture while optimising production and minimising the risks to aquaculture from environmental stressors.

In addition, Core Funding will be used to support engagement with the sector and communication of our science to other stakeholders. Achieving the social licence to operate is a significant issue for the sector, and debates on the economic benefits and environmental consequences of aquaculture need to be well-informed by our science.

Relevance to stakeholders

- ▶ Growing global demand for seafood and food security considerations of key trade partners, when placed alongside finite wild fisheries resources, mean that aquaculture must continue to grow to fill the supply gap.
- ▶ Strengthening investment interest from key trade partners with established markets to acquire and develop premium seafood (specifically finfish) production capability in New Zealand.
- ▶ Domestic investors are seeking opportunities to develop or expand New Zealand aquaculture. There is significant variation in the risk and opportunity profiles across the sector, and NIWA is expertly placed to characterise the opportunities and provide tools to mitigate the associated risk.
- ▶ 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.
- ▶ Shellfish production will continue to be a key component of New Zealand aquaculture. The sector will continue to rely on wild recruitment for the majority of production for the foreseeable future and key aspects of performance (recruitment and retention of spat, growth and condition to harvest) are controlled by interactions between the environment (including climate variability) 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 \$1B per annum by 2025 requires expansion of established production and discrete 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 productivity, environmental performance, animal health, genetic improvement, site suitability and resource consenting.
- ▶ The emergence of intensive land-based production systems in conjunction with conventional marine and freshwater farming activities as a means of significant sector growth.
- ▶ 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 production techniques, juvenile stocks and environmental management knowledge are critical to risk management and are key components for the development and maintenance of a competitive market position in a global marketplace.
- ▶ Social licence is critical to resource access and market position. 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 the building of New Zealand's science capacity and capability to meet the future needs of the sector.
- ▶ University of Otago and AgResearch for specialist capabilities in genetic analysis to inform our selective breeding programmes.
- ▶ Research institutes in Australia, Canada, China, Great Britain, Norway and the US with expertise in aquaculture.
- ▶ International aquaculture service and technology providers.

Knowledge and technology transfer/commercialisation

- ▶ Work collaboratively with industry to conduct joint trials of new species, improving efficiency of production from existing species and developing 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 the commercialisation of yellowtail kingfish and hāpuku to existing industry players, new investors (including offshore 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, 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 industry has the social licence to operate and products meet eco-certification and quality criteria for discerning markets.

Key performance indicators

1. First commercial start-up trial for new species finfish aquaculture underway by July 2016.
2. Commercial supply of juvenile fish from the Bream Bay hatchery/nursery for commercial ongrowing by July 2016.
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. Models that predict the effects of marginal environmental conditions (notably temperature and oxygen) on Chinook salmon performance are developed and verified by July 2016.
5. Models which provide short-term forecasts of the effects of environmental variability on shellfish productivity are developed and verified by July 2017.
6. Development of an aquaculture management framework that integrates financial, production and environmental models to help farmers optimise production while operating within accepted environmental limits by July 2017.
7. Develop high performance and sustainably sourced diets in collaboration with the aquaculture feed industry by 2019.



Juvenile kingfish – another species holding great potential for viable production via aquaculture. NIWA aims to help encourage investment in aquaculture by determining suitable marine spaces and developing production technologies that can lead to profitable returns and a low environmental footprint.

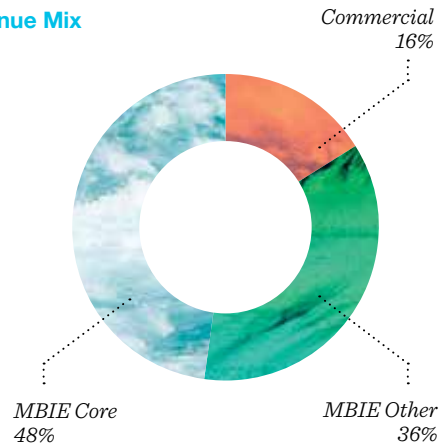
Icebergs in the Ross Sea, Antarctica. Understanding systems that drive weather and climate in the Deep South is vital to NIWA's efforts to forecast climate-change effects on New Zealand.

ADAPTING TO IMPACTS AND EXPLOITING OPPORTUNITIES



Climate & Atmosphere

Revenue Mix



Science within this Centre addresses the following Outcomes 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.
- ▶ 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.
- ▶ Increase understanding of the Antarctic, sub-Antarctic and Southern Ocean climate, cryosphere, oceans and ecosystems and their longer-term impact on New Zealand.

There is a need to reduce national emissions of greenhouse gases and air pollutants to meet international agreements and local regulations, and adapt to current and future climate variations. New Zealand (through NIWA's specialist expertise and infrastructure) makes an important global contribution by monitoring changes to atmospheric composition and regional climate at a key location in the Southern Hemisphere. NIWA's science will monitor and predict regional atmospheric composition and climate change, to validate emission mitigation measures and improve air quality, to provide vital data, tools and knowledge to help central and local government build resilience to climate fluctuations, and to enable productive sectors to prepare for and exploit present and future climate.

National benefit and investment

This Centre will contribute to the following national benefit: New Zealand manages long-term climate change by reducing emissions of greenhouse gases and related pollutants and responds effectively to the opportunities and impacts of current and future climate.

NIWA plans to invest c. \$44M of its Core Funding over the next 5 years on the science programmes described below, addressing both the drivers and consequences of changing climate and atmospheric composition. Atmospheric composition measurements contribute to global scenarios that inform future regional climate. Support for composition, air quality and climate activities and policy also comes from the Ministry of Business, Innovation & Employment contestable funding, central and local government agencies, international partners and climate-sensitive businesses. We will target an increasing contribution from businesses and local government by helping them reduce emissions, and reduce risk and maximise returns through use of tailored climate data, products and information. In collaboration with the Pacific Rim Centre we will continue to seek international funding to support work that builds on our experience with Pacific Island partners of building resilience to climate extremes and climate change. NIWA's Baring Head and Lauder sites, climate observing network and high performance computing facility underpin composition measurements, climate analysis and modelling respectively.

During 2015/16 NIWA will apply 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.
2. Quantify New Zealand's greenhouse gas emissions to improve national inventories and validate mitigation options.
3. Determine the role of oceans in governing climatically important gases and aerosols, and thereby improve global models.
4. Observe and analyse the climate of the New Zealand region, including Antarctica, to determine how the dynamics of the climate system influence our region, and identify the causes of changes.
5. Develop improved predictions of climate and climate extremes on all timescales through dynamical modelling and statistical techniques.
6. Determine present and future vulnerability, impacts and adaptation options to climate variability and change in New Zealand, the South-West Pacific, Southern Ocean and Antarctica.
7. Determine the impacts of air pollutants on human health and evaluate mitigation options.

In addition, Core Funding will be used to support specific sector engagement and outreach activities.

This Centre contributes to addressing the *Deep South* National Science Challenge, including through the alignment of \$1.09M of Core Funding per annum.

Relevance to stakeholders

- ▶ Climate summaries and predictions at seasonal and annual timescales help climate-sensitive sectors maximise productivity and minimise risk, while central and local government need decadal-to-century climate trends and projections to develop policies and plans for use of land and water resources and preparation for natural hazards.
- ▶ Air quality science contributes to setting and revising National Environmental Standards (NES), helping regional councils meet the NES, and providing exposure estimates to inform public health policy.
- ▶ Research contributes to major international science programmes (e.g., International Geosphere Biosphere Program, and Future Earth, World Climate Research programme, ARGO Ocean Observing System, Global Climate Observing System, Scientific Committee for Antarctic Research, Stratospheric Processes and their Role in Climate, Network for the Detection of Atmospheric Composition Change, Total Column Carbon Observing Network).
- ▶ Outputs contribute directly to United Nations Environment Programme assessments and assist in meeting national responsibilities.
- ▶ New Zealand, under the UN Framework Convention on Climate Change and the Global Framework for Climate Services, helps South-West Pacific island nations build capacity to deal with climate extremes and change.

Key science collaborations

- ▶ International agencies that contribute to global atmosphere and ocean measurements, monitoring, analysis and dissemination, and to climate, chemistry-climate and carbon cycling models.
- ▶ National and international research organisations and universities on ocean chemistry, microbiology, air-sea dynamics, air quality and exposure to pollutants, 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.
- ▶ Pacific development organisations that assist with climate monitoring, research and capacity building.

Knowledge and technology transfer/commercialisation

- ▶ Input of quality controlled composition, climate and ocean data into international databases, and contributions to the production of major international assessments such as the IPCC assessment reports and UNEP ozone assessments and international programme reports.
- ▶ Input to Ministry for the Environment, Ministry for Primary Industries and Statistics New Zealand reporting of New Zealand's atmospheric composition, emissions inventories and climate.
- ▶ Work directly with regional councils and the Ministry for the Environment's Air Quality Working Group for direct uptake of research results, tools and services to assist in meeting National Environmental Standards for air quality.
- ▶ Deliver value-added climate products (summaries and outlooks), tools and guidance to help central and local government and climate-sensitive sectors prepare for current and projected climate variability and change.
- ▶ Deliver workshops, roundtables, conferences and publications to share knowledge (e.g., for the New Zealand Climate Change Centre, the NZ Centre for Sustainable Cities).

Impact measures

1. Atmospheric composition measurements from the New Zealand region, climate data and analyses, and direct scientist input have been used in international programmes that inform global science and policy on emissions and climate change.
2. 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.
3. Improved climate outlook and information products provide efficiencies and productivity gains for climate sensitive sectors of the New Zealand economy.
4. Organisations, sectors and councils manage vulnerabilities and exploit opportunities related to climate extremes and change.



An IrriMet monitoring station in Canterbury, feeding weather and soil-moisture data direct to NIWA's supercomputer in Wellington. Information is sent back to the farmer, via the internet, in the form of simple guidance on when – and when not – to irrigate or fertilise.

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. Every month up to and including June 2016 produce and publicly disseminate summaries of current climatic conditions plus outlooks for the coming season.
3. Updated climate change scenario and impacts guidance material, including extremes, based on the IPCC Fifth Assessment Report and regional modelling, has been provided to more end users by July 2016.
4. Human exposure to atmospheric pollutants, including heavy transport in urban areas, has been estimated, the main causes identified and relevant results provided to collaborating health researchers and key agencies, e.g., NZ Transport Agency, Ministry for the Environment and the Regional Councils Air Quality Working Group by July 2016.
5. Carbon cycle models have been combined with surface and satellite observations to estimate the net New Zealand terrestrial and oceanic uptake and emissions of CO₂ by December 2017.
6. 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.
7. NIWA continues to play a leading role in WMO Climate Services and hydrological-related Asia-Pacific initiatives, including commencing Climate Early Warning System (CLEWS) initiatives in two new Pacific Island countries by July 2017 (in conjunction with the Pacific Rim Centre).
8. The rate and variability of atmospheric CO₂ uptake and acidification has been established in New Zealand open-ocean and coastal waters by July 2018.
9. Regional observations of atmospheric and oceanic carbon and other climate-relevant trace chemicals have been used to improve understanding and prediction of the role of Southern Ocean processes on the New Zealand climate by July 2019.
10. A new earth system global climate model has been implemented, achieving reduced biases in Southern Hemisphere radiation balance and sea ice, and is being applied to generate updated climate change scenarios for New Zealand by July 2019.
11. Novel techniques including nitrogen and carbon isotopes in air are established to inform the management and mitigation of major greenhouse gases by July 2019.

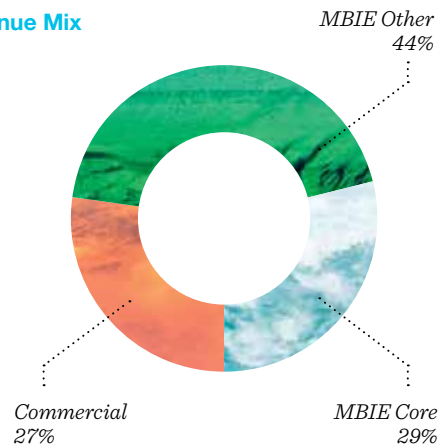
A humpback whale surfaces close to Tangaroa near the Balleny Islands. Increasing understanding of Antarctic and Southern Ocean ecosystems is a key priority for NIWA.

GROWING THE MARINE ECONOMY, WHILE MAINTAINING ENVIRONMENTAL HEALTH



Coasts & Oceans

Revenue Mix



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 5.7M km² 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 there are increased economic returns from marine resources, and marine ecosystem integrity and biodiversity are maintained.

NIWA plans to invest c. \$44M 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 *Sustainable Seas* and *Deep South* National Science Challenges. 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 2015/16 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Marine Physical Processes and Resources: characterisation of the marine geological and oceanic energy resources in New Zealand, the Ross Sea region and the Southern Ocean and the physical processes and environmental factors that affect those resources.
2. Marine Biological Resources: delivery of fundamental knowledge about the diversity and distribution of the marine biota in New Zealand's territorial waters, EEZ and Southern Ocean, over a variety of space and time scales.
3. Ocean flows and productivity: definition of the spatial and temporal variation in New Zealand's ocean current flows, primary and secondary production, and determination of how biogeochemical and physical oceanographic processes influence biotic variability.
4. Ecosystem structure and function: determine the structure of marine ecosystems, the interactions amongst their components that affect ecosystem stability, and develop ecosystem models that can inform management of New Zealand's marine estate.
5. Managing marine ecosystems: determine the characteristics and vulnerability of marine communities, habitats and ecosystems by linking knowledge of how marine ecosystems work to how they are affected by human activity, and address limits to capacity, interactions between multiple stressors, the dynamics of cumulative effects and the underlying controlling factors of ecological recovery.
6. Marine biosecurity: identifying and evaluating biosecurity threats to marine ecosystems from non-indigenous species, and developing tools and approaches to prevent entry, reduce establishment and mitigate impacts.

In addition, Core Funding will be used to support specific sector engagement and science outreach activities.

This Centre contributes to addressing the *Sustainable Seas* National Science Challenge, including through \$3.74M of aligned Core Funding, and the *Deep South* National Science Challenge, including through \$0.17M of aligned Core Funding.

Relevance to stakeholders

- ▶ The *Sustainable Seas* and *Deep South* National Science Challenges will require the science being generated in this Centre. In particular, the programmes described above align directly with the requirements for ecosystem-based management of multiple uses of the marine estate, the key theme in the *Sustainable Seas* challenge.
- ▶ 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 EEZ 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, 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 & 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.
- ▶ Other researchers who are participating in the *Sustainable Seas* and *Deep South* National Science Challenges.

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 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 IPCC 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 EEZ.
2. Biodiversity metrics are used routinely to identify and manage representative and unique examples of marine communities.
3. Key stakeholders, including science providers, are using the results of NIWA predictions/observations of ocean flows and primary productivity to inform their activities (predict future biological production, nutrient supply, dispersal of material, e.g., contaminants, oil spills, invasive species, monitoring strategies).

4. 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.
5. 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. Key regions with high potential for oil and mineral exploration have been surveyed in detail and mapped by July 2016.
2. Establish a database of the distribution of cetacean species to better inform resource management decision making by July 2016.
3. Develop metrics of trophic interconnectivity and ecosystem status for the Hauraki Gulf to provide quantitative measures of how this ecosystem has changed through time by July 2016.
4. The impacts of coastal eutrophication and acidification on marine productivity in at least one location have been elucidated and evaluated, and used to inform relevant regional and government agencies about implications for present and future marine resource utilisation (e.g., aquaculture, fishing) by July 2016.
5. An operable strategy for monitoring marine ecosystem integrity has been developed in collaboration with the Department of Conservation by July 2017.
6. Interactions between physical, biological and biogeochemical processes have been evaluated, and the principal factors affecting open-ocean and coastal marine productivity have been determined by July 2018.



Scientists from NIWA and AAD on watch for humpback whales near Sturge Island in the Balleny Island group.

IrriMet, a new online tool utilising NIWA's high-resolution forecasting capabilities, helps farmers to schedule irrigation based on precise moisture levels in their soil – avoiding waste and reducing the risk of nutrient leaching.

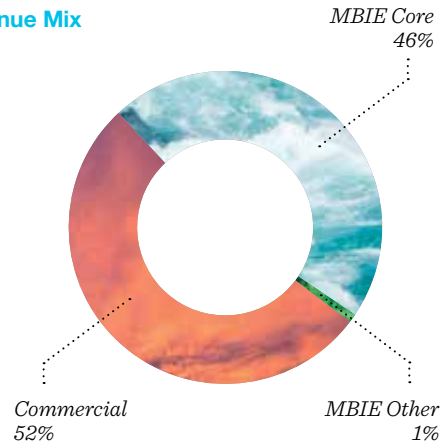


BETTER INFORMATION TO IMPROVE BUSINESS EFFICIENCY AND LOWER RISK



Environmental Information

Revenue Mix



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. New Zealand's climate and aquatic data require improvements in monitoring technology and consistency, quality assurance, spatial coverage, innovation in data collection and dissemination, and integration of monitoring networks to be able to better serve decision making, management and reporting needs both in industry and government. Science in this Centre seeks to provide proven examples of best practice for environmental monitoring, management and quality assurance, and to support development of products and tools based on sound data 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. \$33M of its Core Funding over the next 5 years to assist in 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 particularly targeted towards improving climate observing networks, data capture and information delivery.

During 2015/16 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.
2. Information management: implement and maintain robust information infrastructures to provide future-proof archives for New Zealand's climate, freshwater, marine and biological information.
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.

In addition, Core Funding will be used to support science planning, sector engagement, and science communication 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.
- ▶ Central and local government require nationally consistent environmental information for policy setting and decision making, including State of Environment reporting and production of national environmental statistics and indicators as required by the new Environmental Reporting Bill.

- ▶ 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 across disciplines and want to access and combine data and information from outside 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 (including water quality), and New Zealand Freshwater Fish Database. There is a continuing need to maintain these databases and make them accessible for re-use.

Key science collaborations

- ▶ Ministry for the Environment, Statistics New Zealand, 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 New Zealand's science information delivery more relevant to stakeholders, such as the natural resource sector and industry sectors.
- ▶ Partnering with primary industries to better understand their environmental data needs and uptake will help NIWA better plan for the future.

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.
- ▶ Maintaining databases for climate, water resources, water quality, freshwater and marine biota and improving 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 national training and audit programmes to improve consistency 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. Management, planning, and policy processes related to New Zealand environments and natural resources operate more efficiently through the availability of higher quality, more consistent, and more comprehensive environmental datasets.
4. Climate- and weather-sensitive industries are more profitable and resilient and operate more sustainably through greater use of environmental data to make better decisions.

Key performance indicators

1. Consistent policies, processes, terms and licence agreements have been implemented to govern, clarify, and simplify integrated access to NIWA data by July 2016.
2. 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 2017.
3. '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.
4. Three new technologies that have created increased efficiencies in environmental monitoring, higher accuracies, or improved consistency in national environmental datasets have been adopted by major stakeholders across New Zealand by 2019.



NIWA is forging partnerships with primary industries to better understand their environmental data needs and uptake.

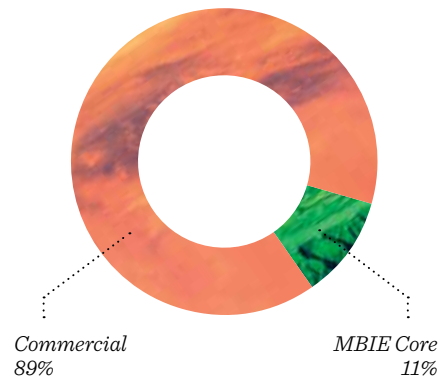
Snapper on ice. Stock monitoring and assessment work undertaken by NIWA is essential to ensuring fish species under the Quota Management System are sustainably managed, whilst allowing for maximum catch and economic benefit.

INCREASING ECONOMIC BENEFIT FROM FISHERIES



Fisheries

Revenue Mix



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 fishing industry currently exports about \$1.3B per year of wild fish product. Stock monitoring and assessment for species under the Quota Management System (QMS) is essential to ensure that fish stocks are sustainably managed whilst allowing for maximum catch and economic benefit. Monitoring catch levels and assessing risks for non-QMS, protected and unwanted bycatch species is becoming increasingly important. 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 fish productivity and ecosystem health. Our science aims to grow the economic returns from our fisheries through both sound stock and environmental management, such that the harvest is sustainable and the product is desired in the marketplace. Our expertise is being applied to fisheries resource and management issues in the Pacific.

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 2015/16 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.
2. Develop and apply standardised methodologies to monitor and assess international fisheries outside the New Zealand EEZ and determine the environmental effects of fishing.
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.
4. Develop approaches to enhance fisheries value and improve market access.

In addition, Core Funding will be used to support specific sector engagement and outreach activities.

This Centre contributes to addressing the *Sustainable Seas* National Science Challenge, including through the alignment of \$0.6M of Core Funding.

Relevance to stakeholders

- ▶ Ministry for Primary Industries, fishing industry, and Māori objectives for managing and utilising New Zealand fisheries resources require both ongoing 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 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, National Plans of Action for Seabirds and Sharks).
- ▶ 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, the Ministry of Foreign Affairs and Trade, fishing companies and Māori, to ensure our research continues to add value nationally and internationally.
- ▶ Research organisations active in Antarctic and Pacific marine research.
- ▶ University of Auckland, through the Joint Graduate School in Coastal & Marine Science, to ensure the building of New Zealand's science capacity to meet the future needs of the sector.
- ▶ Other researchers who are participating in the *Sustainable Seas* National Science Challenge.

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, industry, recreationalists and Māori.
- ▶ Conduct annual surveys, characterisations, analyses, and assessments for the Ministry for Primary Industries, Department of Conservation, Ministry of Foreign Affairs and Trade, industry and Māori.
- ▶ Conduct annual surveys, characterisations, analyses and assessments for other countries seeking to manage their fisheries.
- ▶ Present the results to Māori and stakeholder working groups at international forums and in research reports.



Dave Allen

Mature hāpuku at NIWA's Bream Bay Aquaculture Park, Northland.

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 wild fisheries increases as premium markets are secured through environmental certification.

Key performance indicators

1. Developed and implemented a comprehensive communication strategy to increase visibility of New Zealand fisheries research nationally and internationally by July 2017.
2. Conducted at least one international resource survey to support fisheries management by July 2017.
3. Developed a broader ecosystem-based management approach that includes a fisheries component (in conjunction with the Coasts & Oceans Centre) by July 2017.
4. Developed a new risk assessment approach for informing research prioritisation and management of fisheries bycatch by July 2018.
5. NIWA's contribution to Pacific fisheries management has expanded, with at least two projects completed in the Asia/Pacific region (in conjunction with the Pacific Rim Centre) by July 2019.

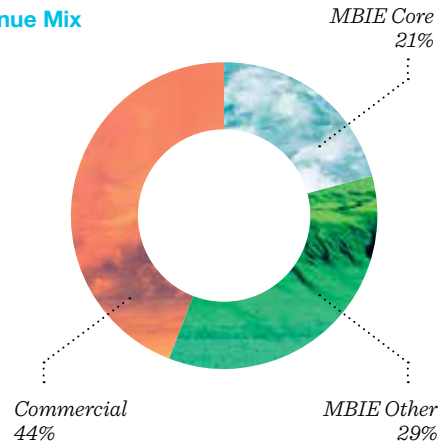
New Zealand's freshwater and estuarine resources are key national assets providing significant economic, social and environmental benefits. NIWA's science underpins the work of many organisations to sustainably manage these resources.

INCREASING UTILISATION WITHOUT SACRIFICING THE ENVIRONMENT



Freshwater & Estuaries

Revenue Mix



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 freshwaters¹. These reforms are targeted at responding to the recommendations of the Land and 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. The 2014 amendment of the National Policy Statement for Freshwater Management (NPS-FM) included a National Objectives Framework that provided for compulsory national values of ecosystem health and human health for freshwaters. It also set national bottom lines for a number of attributes. Science within this Centre aims to provide the evidence base for these new approaches, such that economic returns within a greening economy are optimised within environmental constraints.

¹ Freshwater reform 2013 and beyond, March 2013 and National Policy Statement for Freshwater Management 2014.

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. \$20M 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 *Our Land and Water* and *New Zealand's Biological Heritage* National Science Challenges. 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 in response to the government's water reforms.

During 2015/16 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.
2. Sustainable water allocation: understanding and predicting effects of human use and modification of rivers and groundwater systems for sustainable allocation.
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 water.
4. Catchments to estuaries: understanding and predicting the functional connections between catchments and estuaries to improve diffuse-source contaminant management.
5. Freshwater biosecurity: identifying and evaluating threats from non-indigenous species, minimising risks of their establishment and developing tools to mitigate their impacts.
6. Ensuring ecosystem health: developing techniques for biodiversity enhancement, rehabilitation and protection of freshwater values under future economic growth scenarios.

In addition, Core Funding will be used to support specific sector engagement and outreach activities.

This Centre contributes to addressing the *Our Land and Water* National Science Challenge, including through \$1.07M per annum of aligned Core Funding, and the *New Zealand's Biological Heritage* National Science Challenge, including through \$0.97M of aligned Core Funding per annum.

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. This is also an underlying tenet of the *Our Land and Water* National Science Challenge and an objective of the next phase of the government-appointed Land and Water Forum.
- ▶ Prompted by the government's water reforms signalled in the 2014 NPS-FM there is a requirement for regional councils to set objectives and limits for water quantity and quality in consultation with stakeholders, and then establish means to manage within those limits.
- ▶ Alignment of research with the National Objectives Framework that is integral to the 2014 NPS-FM is requiring our research both to verify existing attributes in the framework and to develop new attributes to expand the framework over future years.
- ▶ 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 future step.
- ▶ A growing national desire to maintain and restore key species and 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 and alignment with the *New Zealand's Biological Heritage* National Science Challenge.
- ▶ 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 efficient water use (Landcare Research), groundwater-surface water interactions (GNS Science, ESR) and on-land generation of contaminants (AgResearch).
- ▶ Universities for work on lake and estuarine ecosystems and restoration of urban and rural waters.

- ▶ Independent research organisations (Aqualinc, Cawthron) for work on the hydrological cycle, and flow and nutrient effects on aquatic ecosystems.
- ▶ International research institutes with expertise in hydrology, environmental flows, water quality, ecology, catchment modelling, biosecurity and restoration technology.
- ▶ Others involved in the *Our Land and Water* and *New Zealand's Biological Heritage* National Science Challenges.

Knowledge and technology transfer/commercialisation

- ▶ Provide technical advice to lead ministries developing and implementing new national freshwater policies in response to the government's recent water reforms.
- ▶ Work with Ministry for the Environment and Statistics New Zealand on improving national water accounts and state of environment reporting as required by the Environmental Reporting Bill.
- ▶ Provide technical advice to freshwater policy, planning and management processes, including the new community collaborative approach required under the freshwater reforms.
- ▶ Help regional councils implement the NPS-FM for flow setting.
- ▶ 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 implementing a limits-based approach for managing freshwaters as required by the National Objectives Framework.
- ▶ With collaborating research agencies, provide science-based solutions for reducing contaminant movement from land to water.
- ▶ Provide freshwater biosecurity advice to regional authorities, Land Information New Zealand, Department of Conservation and hydropower companies, and work with the 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 and science-based policy development.

Impact measures

1. Increased economic benefit has been derived from use of our water resources with no loss of environmental values, 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. The national hydrological model Topnet has been delivered to three regional councils for regional-scale water resource assessments by July 2016.
2. Predictive tools for managing water quality to limits under the NPS-FM to assist with water management have been used by at least two regulatory agencies by 2017.
3. At least one novel method for control of aquatic pests has been identified and trialled by July 2016.
4. Innovative wastewater treatment technologies have been demonstrated and adopted by at least three local councils by July 2017.
5. 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.
6. NIWA's science on deriving targets and limits for water quality and ecosystem health has been used to improve national consistency in freshwater management using the National Objectives Framework by July 2018.
7. Improved tools for water allocation decisions that balance out-of-stream benefits against in-stream values will be adopted by regulatory agencies by July 2018.



NIWA is working with a number of partners to help implement aspects of the National Policy Statement for Freshwater Management.

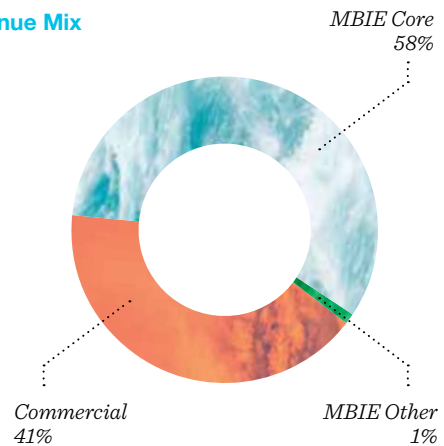
A key NIWA priority is to help increase the resilience of New Zealand and the South-West Pacific islands to weather and climate hazards, including droughts, floods and sea-level change.

INCREASING RESILIENCE TO NATURAL HAZARDS



Hazards

Revenue Mix



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, tsunami, landslides, damaging winds and waves, storm surge, coastal erosion and volcanic eruptions. The impact of these hazards on our society and the economy is enormous, and hazard risk continues to increase as the population and infrastructure grows. Further climate change will exacerbate this risk, particularly for river floods (higher runoff) and coastal hazards, including tsunami, from accelerating sea-level rise. NIWA's science, in collaboration with others in the Natural Hazards Research Platform, will provide information and planning/design tools to increase resilience to natural hazards, and provide timely forecasts to minimise the impacts of extreme events. The skills developed in this Centre also contribute to research on environmental forecasting, adaptation to climate change, and marine geo-hazards information, and support joint tsunami and seismic work with GNS Science and infrastructure and land-use planning consultancies. The capability developed in this Centre is 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 (including tsunami), proactively planning, reducing losses and speeding recovery, now and in an environment that is being modified by both climate change and land-use changes.

NIWA plans to invest c. \$23M of its Core Funding over the next 5 years on research and delivery mechanisms required to inform planners, emergency management stakeholders, infrastructure 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. Modest revenue growth is anticipated through the *Resilience to Nature's Challenges* National Science Challenge, mainly in engaging with communities on coastal hazards. Hazard forecasting is critically dependent on the NIWA High Performance Computing Facility, and NIWA's weather, hydrological and coastal station networks.

During 2015/16 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.
2. Evaluate the risk, impacts and potential losses due to weather-related hazards to inform planning for risk reduction and emergency response.

In addition, Core Funding will be used to support specific sector engagement and outreach activities.

This Centre contributes to addressing the *Resilience to Nature's Challenges* National Science Challenge, including through the alignment of \$3.88M per annum of Core Funding.

Relevance to stakeholders

- ▶ Weather-related hazards have high economic impacts on many productive and infrastructure sectors of New Zealand, including agriculture, forestry, horticulture, transport and energy, as well as communities.
- ▶ Marine-geological hazards, including offshore faulting, volcanoes and tsunami, pose a low-probability but high consequence risk to New Zealand's highly-developed coastal areas and associated infrastructure, including roads, airports and ports.
- ▶ Legislation and government strategies signal some changes in hazard-risk management from a reactionary response and recovery approach to risk assessment/tolerance and reduction to increase community and infrastructure resilience.
- ▶ Investment in risk-reduction and/or planning and policy by central and regional government relies on assessment of the comparative risk of various hazards threats and how that might change with changing climate.
- ▶ National legislation (e.g., Fire Service Act 1975, Resource Management Act 1991 and NZ Coastal Policy Statement) and planning/policy documents (e.g., Ministry for the Environment's Flood Risk Review, National Infrastructure

Plan 2011) call for the ability to reduce the economic, social and environmental impacts of future hazards through the application of reliable planning and forecast information.

- ▶ Improved forecasting accuracy will be required to ensure the security of electricity supply as the proportion of weather-dependent renewables increases.

Key science collaborations

- ▶ Local government, the primary industry sector, energy generators, engineering consultancies and port companies for complementary meteorological and coastal hazard data.
- ▶ Central government agencies in relation to setting policy, developing guidance or standards, input to planning processes and supporting national warnings (tsunami), particularly the Ministry for the Environment, Ministry of Civil Defence and Emergency Management, Ministry of Transport, NZ Transport Agency, and the National Infrastructure Unit (Treasury).
- ▶ Scion and the National Rural Fire Authority, collaborators in developing and implementing the Fire Weather Monitoring System.
- ▶ 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 (to which NIWA contributes the marine-based information).
- ▶ The Met Office (United Kingdom) for supply of observations, data assimilation and numerical weather prediction models, and collaborative research and development.
- ▶ Engineers, economists and social scientists to provide input on the vulnerability of structures and the direct and indirect hazard impacts and their costs and benefits of risk reduction.
- ▶ International research programmes on the predictability and societal impacts of weather hazards (e.g., the World Meteorological Organization's High Impact Weather Project and the multi-agency Hydrologic Ensemble Prediction Experiment (HEPEX) programme on flood prediction).
- ▶ Others involved in the *Resilience to Nature's Challenges* National Science Challenge, particularly in relation to themes on coastal risks and rural-sector risks.

Knowledge and technology transfer/commercialisation

- ▶ Generate and deliver tailored operational forecasts (24/7) to key weather- and water-sensitive sectors via a multi-hazards forecasting information delivery system.
- ▶ Provide tools and information (e.g., frequencies and magnitudes for floods, winds and coastal inundation) directly to national and local government, businesses, civil defence and emergency management groups, infrastructure and engineering lifelines groups, and direct input into design standards (e.g., flood and wind loading, coastal development standards).

- ▶ Provide marine faulting information to supplement terrestrial datasets for the National Seismic Hazard Model being regularly updated by GNS Science.
- ▶ 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 resource-management planning hearings, workshops, commissioned projects and submissions.
- ▶ Apply skills offshore (particularly to the Pacific Islands) to improve resilience of communities to weather- and water-driven hazards and tsunamis.

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-risk management (both physical measures and sustainable land-use planning) has been optimised through quantifying the risks from weather-related hazards and tsunamis.
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. High-resolution forecasts including data assimilation have been applied in the international Deepwave experiment and to improve output from downstream flood and ocean wave models by July 2016.
2. Coastal inundation modelling outputs, which include effects due to tides, storm surge, and ocean waves to a defined vertical land datum, have been developed, validated and implemented in a new forecast system by July 2016.
3. RiskScape has been used at the national scale to set policy or guidance in making investment decisions on the long-term benefit of risk reduction and implemented in 1–2 regions to influence land-use planning or hazard-reduction measures by July 2017.
4. Mean sea-level anomaly, combined with red-alert tide dates, is built into an operational 3-month forecast for New Zealand to highlight potential coastal inundation dates by July 2017.
5. Observational data gathered as part of the international Deepwave experiment have been used to improve representation of gravity wave processes in forecast models by July 2018.

6. Hazard (and quiet time) forecasts are based on a combination of very high resolution models and model ensembles that provide uncertainty estimates by July 2018.
7. High resolution weather re-analysis data for all New Zealand within the current climate (1980–2010) are available for application across both productive and hazard sectors by July 2018.
8. Measures to assess resilience to hazards, climate extremes and climate change are in place, delivered via the RiskScape tool, to inform planning and mitigation priorities by July 2018.
9. Weather extremes in a changed 2080–2110 climate have been modelled New Zealand-wide at high resolution, providing localised guidance on the future likelihood and impacts of coastal hazards, flooding and wild fire by July 2020.



Extreme weather has taken its toll on many sectors of the New Zealand economy recently. Farmers have been particularly hard hit. Research by NIWA aims to predict the likely frequency and intensity of such events – seasons, years and even decades ahead.

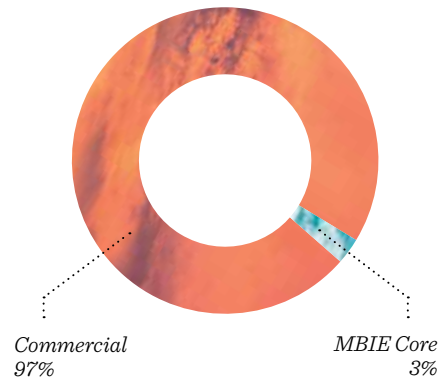
The Pacific region faces ever-increasing environmental challenges, especially in relation to food and water security. NIWA is helping to advance sustainable management of marine and freshwater resources, reduce community and economic vulnerability to natural hazards, and adapt to the impacts that climate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

TRANSFERRING KNOWLEDGE AND BUILDING RELATIONSHIPS



Pacific Rim

Revenue Mix



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.

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 increase prosperity through sustainably managed natural resources and to increase resilience to the impacts of 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 2015/16 NIWA will utilise these revenue sources to undertake the following science programme:

1. Provide scientific advice and build local capacity in the Asia-Pacific region to support environmental, infrastructure and economic decision making and development.

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 ongoing focus on areas that align with New Zealand's development aid objectives.
- ▶ New Zealand's international development assistance (through the Ministry of Foreign Affairs and Trade International Development Group – MFAT-IDG) is focused through three types of country engagement: (1) core partners (Papua New Guinea, Solomon Islands, Vanuatu, Kiribati, Tuvalu, Fiji, Tonga, Samoa, Indonesia, and Timor-Leste); (2) constitutional partners (Cook Islands, Niue and Tokelau) and; (3) targeted engagement partners (Nauru, Philippines, Laos, Cambodia, Myanmar, Viet Nam, Afghanistan and Sri Lanka).
- ▶ Growing New Zealand's international effectiveness through science diplomacy and the development of bilateral scientific collaboration with Europe and the US.
- ▶ Regional agencies and Pacific government partners are increasingly realising the value NIWA provides through technical support for the development of proposals for global funding initiatives, and technical support in implementation.
- ▶ Opportunities for greater New Zealand technical support to assist oceanic-related economic development activities including fisheries and deepsea mineral resources in the Pacific region.

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 to support sustainable economic development within 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 and other regional and donor staff.

Impact measures

1. New Zealand's science-based activities and initiatives in the Pacific Rim have helped 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 annually 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 2016.
2. NIWA continues to play a leading role in WMO Climate Services and hydrological-related Asia-Pacific initiatives, including commencing Climate Early Warning System (CLEWS) initiatives in two new Pacific Island countries by July 2017 (with the Climate & Atmosphere Centre).
3. New science collaboration is established with two new Pacific-focused projects in the areas of water quality/ wastewater management, deepsea minerals or fisheries by July 2017.
4. NIWA's contribution to international fisheries management has expanded, with at least two major projects completed in the Asia-Pacific region (with the Fisheries Centre) by July 2019.
5. Tools to support risk-based urban and infrastructure planning are developed and implemented in at least two Pacific Island countries by July 2018 (with the Hazards Centre).
6. Tools to improve coastal/flood inundation forecasting are developed and implemented in at least one Pacific Island country by July 2018.

NIWA will invest about \$1M of Core Funding over the next 5 years to advance knowledge transfer and relationship-building in the Pacific region.



NIWA scientists collect longfin and shortfin eels in Te Waihora (Lake Ellesmere), Canterbury. The eel study is part of a multidisciplinary research programme monitoring the benefits of macrophyte re-establishment in the lake.

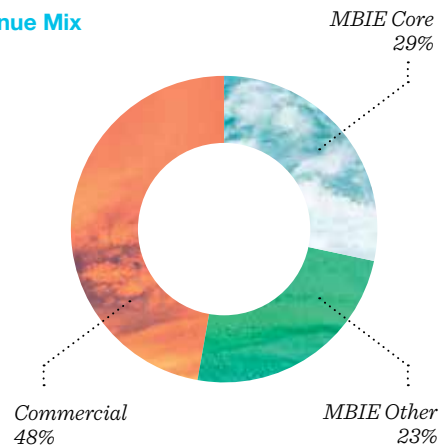


TRANSFERRING KNOWLEDGE FOR ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFIT



Te Kūwaha

Revenue Mix



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 \$37B, 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, low². 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.

² Source: Treasury economic outlook December 2012. [taskforce/met-rep-assetbaseincexpend-2011.pdf](http://www.tpk.govt.nz/_documents/taskforce/met-rep-assetbaseincexpend-2011.pdf) http://www.tpk.govt.nz/_documents/taskforce/met-rep-assetbaseincexpend-2011.pdf

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 2015/16 NIWA will utilise these revenue sources to undertake the following science programmes:

1. Develop tools for the management and restoration of aquatic taonga species.
2. Develop knowledge and tools that support increased investment and returns from the Māori economy.

In addition, Core Funding will be used to support specific sector engagement and science communication activities.

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 significant investors 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 pose 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 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. Successful implementation of research/tools that improve productivity for two large entities within the Māori primary sector by July 2016.
2. Complete at least two joint studies with iwi on restoration of aquatic taonga species by July 2017.
3. Assist in the establishment of a Māori aquaculture business utilising our R&D by July 2018 (with the Aquaculture Centre).

NIWA is working closely with Māori to develop tools for the management and restoration of aquatic taonga species.



A large blue and white research vessel with 'NIWA' on its side sailing on the ocean. The vessel is moving from right to left, leaving a white wake. The sky is a clear, light blue. The text is overlaid on the left side of the image.

**SOPHISTICATED
PLATFORMS
PROVIDING
INFORMATION
REQUIRED
TO INCREASE
RETURNS WITHOUT
ENVIRONMENTAL
SACRIFICE**



Vessels

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.

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. In 2014, a new sub-bottom profiler was installed, which has enabled deeper penetration into the sub-seabed environment and at a much higher resolution than previously. These improvements have broadened *Tangaroa's* capability both for science and commercial opportunities. 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., mineral exploration companies). All these sources of revenue are needed to maintain the viability of the vessels' operations.

Relevance to stakeholders

- ▶ Access to research vessel platforms of excellence will encourage and facilitate industry exploration and investment into exploitation of ocean-based oil, gas and mineral resources.
- ▶ Specially-equipped vessels are needed 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).
- ▶ 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).
- ▶ The ability to respond quickly and provide valuable scientific data relating to hazardous events of national significance such as the Canterbury and Cook Strait earthquakes.
- ▶ Continue to gain a better understanding of risks posed to society by seabed tectonic movements, volcanic eruptions and sediment stability.
- ▶ NIWA's maritime capability allows New Zealand to further discover its marine estate, enabling government, industry and public decision makers to realise environmental and economic values that lie within.

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.
- ▶ Marine-based industries to provide research vessel platforms that will help promote and grow economic return from marine resources.
- ▶ International government bodies and academic institutions to ensure New Zealand is keeping abreast of cutting-edge science and marine technology.
- ▶ 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. The assessment of environmental effects from marine commercial activities are facilitated by the provision of scientific data.
3. 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. *NIWA safe* pathway to zero harm is implemented, and operations aspire to zero harm.
2. Scientific voyages conducted on the vessels are on time and within specifications and to the satisfaction of stakeholders and clients.
3. Key government agencies have worked in partnership with NIWA to develop a revenue strategy that will ensure efficient use and maximum utilisation of *Tangaroa* into the future.
4. Marine-based industries are using NIWA's vessels to explore ocean resources within the New Zealand EEZ.
5. That vessels act as a conduit for the implementation and cross-pollination of cutting-edge science within New Zealand waters, from internationally recognised organisations and scientific teams.
6. Annual utilisation of *Tangaroa*, *Kaharoa* and *Ikatere* meet budget.



Kaharoa - designed primarily for coastal surveys, but works throughout the EEZ and much further afield.

Ikatere is highly manoeuvrable, ideal for shallow-water research and commercial work.



Appendix 3: 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.

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) Core funding

NIWA and the Crown are parties to a Core Funding Agreement (CFA) under which the Crown contracts NIWA to perform research activities that support its Statement of Core Purpose (SCP). Specific SCP outcomes, and their associated delivery programmes, are agreed annually with Shareholding Ministers and documented in NIWA's Statement of Corporate Intent.

For financial reporting purposes this Core Funding is treated as a Government Grant in terms of NZ IAS 20. Core Funding is recognised as income in profit or loss on a systematic basis in the period in which the expenses related to the research activities performed under the CFA are 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 and 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>Ikatere</i> hull	20 years

Plant and equipment

Plant and equipment	10 years
Scientific equipment	8 years
EM300 swath system	4 years

Electronic data processing equipment

Supercomputer	8 years
Electronic data processing equipment	3 years

Other

Office equipment	5 years
Furniture and fittings	10 years
Motor vehicles	6 years
Small boats	10 years

Appendix 4: Advisory Panels

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 panel listed below.

Advisory Panel to the Board

During its strategic planning the NIWA Board sought advice from the following panel:

Dr Bruce Mapstone – Chief, CSIRO Marine and Atmosphere Research, Australia

Dr Rob Vertessy – Director of Meteorology, Bureau of Meteorology, Australia

Dr David Carter – Group Director, Beca

Dr Paul Reynolds – ex-Chief Executive, Ministry for the Environment

Professor Wendy Lawson – Pro Vice Chancellor Science, University of Canterbury

Volker Kuntzsch – Chief Executive, Sanfords

Stakeholder Panels

In prior years the NIWA Executive and management have formally sought advice from stakeholder panels with interests in aquaculture, fisheries, coasts and oceans, freshwater, climate and atmosphere, environmental information, Māori and vessel operations. These individuals were drawn from industry, peak sector bodies, and regional and central government agencies.

In preparing this SCI we did not re-convene these stakeholder panels as it became apparent that stakeholders were fully-engaged in the National Science Challenge consultation processes and we could draw on that process, our frequent meetings with key organisations, and current direction setting documents from government agencies and sector peak bodies. We will review our approach prior to preparation of the next SCI.

Appendix 5: 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 workplace 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.

Appendix 6: NIWA's Data Management and Access Policy

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 conforms to 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.
- ▶ Public access to data and information, with appropriate commercial pricing when appropriate.
- ▶ Continuous improvement to accommodate technological advances and ensure long-term custodianship and access to data and information.

DIRECTORY

Board of Directors

Chris Mace (Chairman)
Craig Ellison (Deputy Chairman)
Dr Helen Anderson
Professor Keith Hunter
Professor Gillian Lewis
Nick Main
Jason Shoebridge

Executive Team

John Morgan (Chief Executive Officer)
Patrick Baker (Chief Financial Officer & Company Secretary)
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)
Dr Rob Murdoch (General Manager Research)
Andrew Watkins (General Manager Information Technology)

Solicitors

Bell Gully
Atkins Holm Majurey Ltd

Auditors

Price Waterhouse Coopers 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

HIGHER CLEARER DEEPER

These three words reflect the scientific advances we make every day at NIWA.

Our three core areas of expertise, where we have the responsibility as New Zealand's predominant science providers, are climate and atmosphere, freshwater, and oceans – natural environments that are interconnected in innumerable ways. But they also present economic and social opportunities which require comprehensive scientific understanding for us to take advantage of them responsibly.

That is where NIWA comes in.

HIGHER
CLEARER
DEEPER