SCIENCE FOR A RESILIENT FUTURE

NIWA Statement of Corporate Intent 2023/24

NIWA
Taihoro Nukurangi

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NIWA Statement of Corporate Intent 2023/24

Science for a resilient future

Cover: NIWA hydrodynamics technician Jochen Bind using real-time GPS survey equipment to accurately map floodwater levels to help build detailed river flow models to inform future planning. (Rebekah Parsons-King)

IFC: Gabrielle unleashed wind, rain, floodwaters, silt, downed timber and other debris on immaculate and highly productive enterprises. (Rebekah Parsons-King)

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Climate, Freshwater & Marine Science

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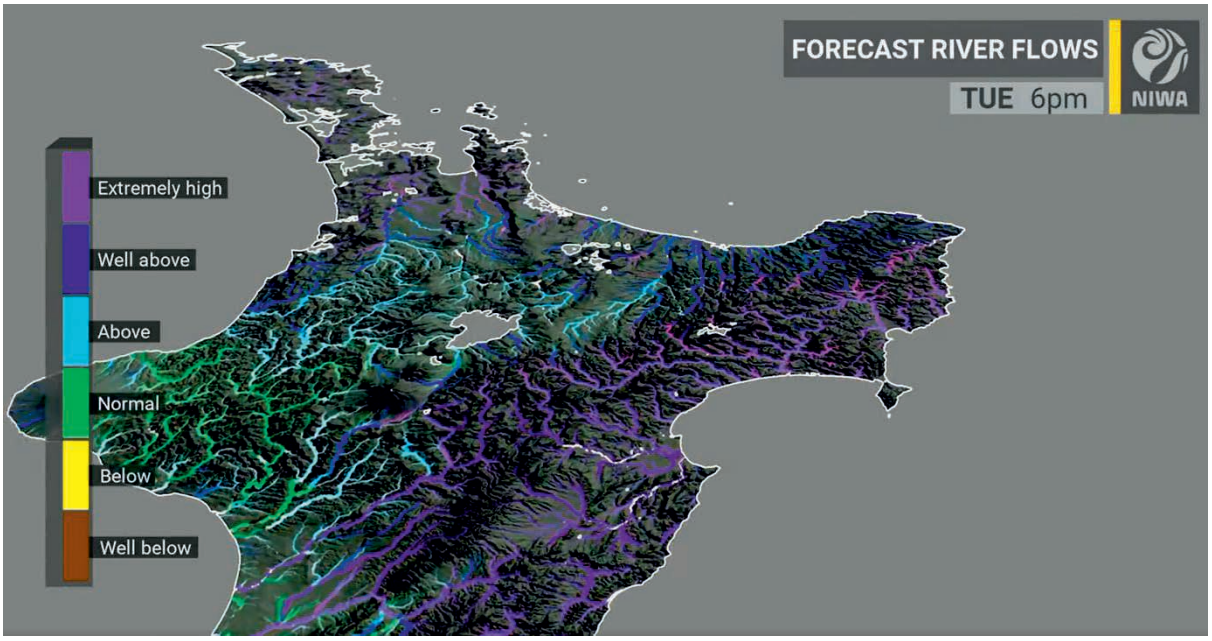
Guiding a resilient future

During the 2022/23 financial year, Aotearoa New Zealand was challenged by extreme weather and climate events on top of a socioeconomic environment with high inflation, supply chain constraints and other obstacles – all while recovering from the global effects of COVID-19. These challenges had a major and widespread impact on communities, the national economy and both natural and productive environments. Over the coming year we expect these challenges to continue. Nevertheless, we are confident that we have the financial resilience and operational systems in place to manage the impacts on NIWA and meet the increasing demand for our science knowledge, skills and services.

The global weather and climate extremes we have experienced in 2023 are already unprecedented, and we expect these impacts of a warming world to be exacerbated in 2024 as the planet moves from a La Niña to an El Niño weather pattern. Our science will be essential to enable New Zealand and the wider Pacific to build resilience and adapt to the predicted increase in extreme weather events in response to accelerated changes to the climate. This Statement of Corporate Intent (SCI) outlines our increase in focus on climate change adaptation, especially as it relates to weather and climate hazards, water security, renewable energy, the natural environment and the primary production sector. We will also continue our extensive involvement in the response and recovery initiatives associated with Cyclone Gabrielle, especially as they relate to future flood risk and mitigation, as well as government initiatives to improve forecasting and future emergency management response to severe weather events.



NIWA is combining its high-resolution rainfall forecasts with flow model tools to develop a system to map flood hazard consistently across the whole country. In Gabrielle's wake the NIWA team refocused their efforts on urgent new flood hazard maps for the worst effected parts of Hawke's Bay, and additional funding from MBIE enabled the work to be extended across the rest of the region and Tairāwhiti.

We will accelerate our investment in advanced technologies, data science and infrastructure to ensure we can deliver the quality science outlined in this SCI. We will also increase our operational agility, strengthen Māori partnerships and broaden collaboration with key national and international science providers and stakeholders to ensure that our science is relevant and used. This SCI outlines how we will grow our revenues and further invest in, build and apply the leading-edge capabilities required by our science and its application. This will require a strong focus on financial management – particularly because of the current challenging fiscal environment – to ensure that we can continue to invest in our people, infrastructure and science assets.

In 2021/22 we initiated a number of major projects associated with our ten-year capital investment plan, and several of these will be completed in 2023/24. As part of our property development programme, the new Hamilton premises will be completed and operational by mid-2023, and we continue to support and advance the planned investment in new facilities on our Wellington site, including the accommodation of other science institutions involved in the establishment of a National Centre for Climate, Oceans and Hazard Research.

Construction of the experimental, commercial-scale recirculating aquaculture system (RAS) at our Northland Aquaculture Centre has been completed and the facility will become fully operational in the coming year. The system has been designed to produce more than 600 tonnes of kingfish per year, and represents the first introduction of a high-value finfish into the New Zealand aquaculture sector since the introduction of salmon more than 50 years ago. The construction of a new vessel to replace our mid-sized coastal research vessel *Kaharoa* is well underway, and delivery is expected by March/April 2024. In addition, planning is underway for the replacement of our high-performance computing facility to ensure that it can meet NIWA's and the wider research community's future eScience needs. Advancing these projects in collaboration with our partners, especially those projects entering the operational phase, will be a significant focus.

This SCI outlines our commitment to maintaining and developing the critical scientific capability, services and support the government needs to build resilience to global change and contribute to the national economy and social wellbeing. A particular focus is to support key government priorities and initiatives associated with the research, science and innovation (RSI) system. This includes the Te Ara Paerangi – Future Pathways review to position New Zealand's research system for the future; meeting national priorities; supporting the wellbeing of, and growing, an equitable, diverse and inclusive RSI workforce; and continuing to develop capability, skills and networks with Māori.

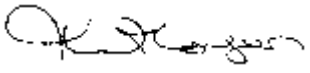
We will ensure our financial management, operations and strategic priorities in freshwater, climate and marine science are well-aligned with current government priorities and policies. In this context, during 2023/24, NIWA will:

- Continue its strong financial performance by building future revenues and managing costs to support the cash flow required to meet the needs of the capital programme while maintaining financial viability.
- Reduce the scope of the science delivered through the Strategic Science Investment Fund to increase NIWA's agility and ensure that its science continues to focus on impact in areas of national priority.
- Strengthen its service delivery to government agencies, primarily the Ministry for Primary Industries, Ministry for the Environment, Department of Conservation and National Emergency Management Agency, especially in relation to management of natural resources and building resilience to severe weather and climate events.
- Provide the necessary information and tools to guide climate change adaptation plans and actions by central and local government, business, Māori and communities generally.
- Accelerate generation of the risk information required to increase national resilience to natural hazards, especially extreme weather and climate events, via the RiskScape partnership between GNS Science, NIWA and Toka Tū Ake EQC.
- Work with the government to ensure that New Zealand's future weather and climate forecasting and impact capability is fit for purpose and designed to meet the nation's future needs, especially in relation to the increasing impacts of climate change.
- Build a portal to facilitate access to NIWA's weather and climate data and data products, and link to government initiatives to help Māori, businesses and communities generally adapt to environmental change.

- Grow its data science capabilities and associated technologies, and develop a business plan and commence procurement of a new high-performance computer to meet its future research and operational needs, as well as those of the wider science system.
- Increase focus on research to support the sustainable development of renewable energy generation and associated infrastructure.
- Commence commercial-scale production of kingfish in the RAS, in partnership with a national seafood organisation and in collaboration with international producers of kingfish, to grow national and global markets for kingfish and advance commercial production of kingfish by the New Zealand aquaculture sector.
- Work with Māori partners to identify the impacts of climate change on Māori communities and resources, and co-develop tools to minimise these impacts on iwi/hapū/whanau wellbeing.
- Together with other CRIs, increase the growth of Māori research capacity through initiatives such as Te Piko o te Māhuri: Tērā te tipu o te Rākau, an initiative that provides pathways and opportunities for young Māori researchers to advance their postgraduate science careers.
- Continue to develop enduring relationships with key Pacific countries and regional partners to ensure its science supports a wide range of Pacific development activities and builds Pasifika science capability and capacity.
- Continue its focus on supporting staff wellbeing, while maintaining organisational productivity and performance.
- Review and refresh its performance and development system and processes to ensure they are understood by and advance the development of our staff.
- Foster diversity within all levels of the organisation, maintain a family friendly workplace and support the Senior Leadership Development programme to grow future leaders.
- As part of the Wellington Science City initiative, commence planning with Victoria University of Wellington, GNS Science, Massey University and other partners to build new facilities on the NIWA Greta Point site required for the establishment of a National Centre for Climate, Oceans and Hazard Research.
- Work with the other CRIs through Science New Zealand to strengthen the collective approach to sharing resources and capital investments, strategy development, co-location, stakeholder engagement and giving effect to Te Tiriti o Waitangi obligations and expectations.
- Provide input through submissions, participation on expert advisory groups and agency secondments into reviews of key central and local government legislation and regulations, including the Te Ara Paerangi – Future Pathways initiative.
- Complete the construction and commissioning of the new coastal research vessel, along with employment of its crew, and commence operations such as the coastal fisheries stock assessments required by Fisheries New Zealand.
- Continue its pathway towards carbon neutrality by 2025; and
- Continuously review and adapt NIWA's financial planning and capital investment strategies to ensure that it can support the workforce, infrastructure and science assets needed to deliver national science priorities.

We are pleased to present NIWA's 2023/24 Statement of Corporate Intent, which describes our strategy for meeting the obligations outlined in our Statement of Core Purpose. This SCI places emphasis on the organisational and science strategy initiatives that will enable NIWA to deliver the outcomes required by New Zealand to meet its current environmental, social and economic challenges and opportunities. It reaffirms NIWA's ongoing commitment to delivering quality, impactful science for the nation's benefit through collaboration, investing in our people and assets, and maintaining our strong and sustainable financial performance.

Barry Harris
Chairman



John Morgan
Chief Executive

Our Mission

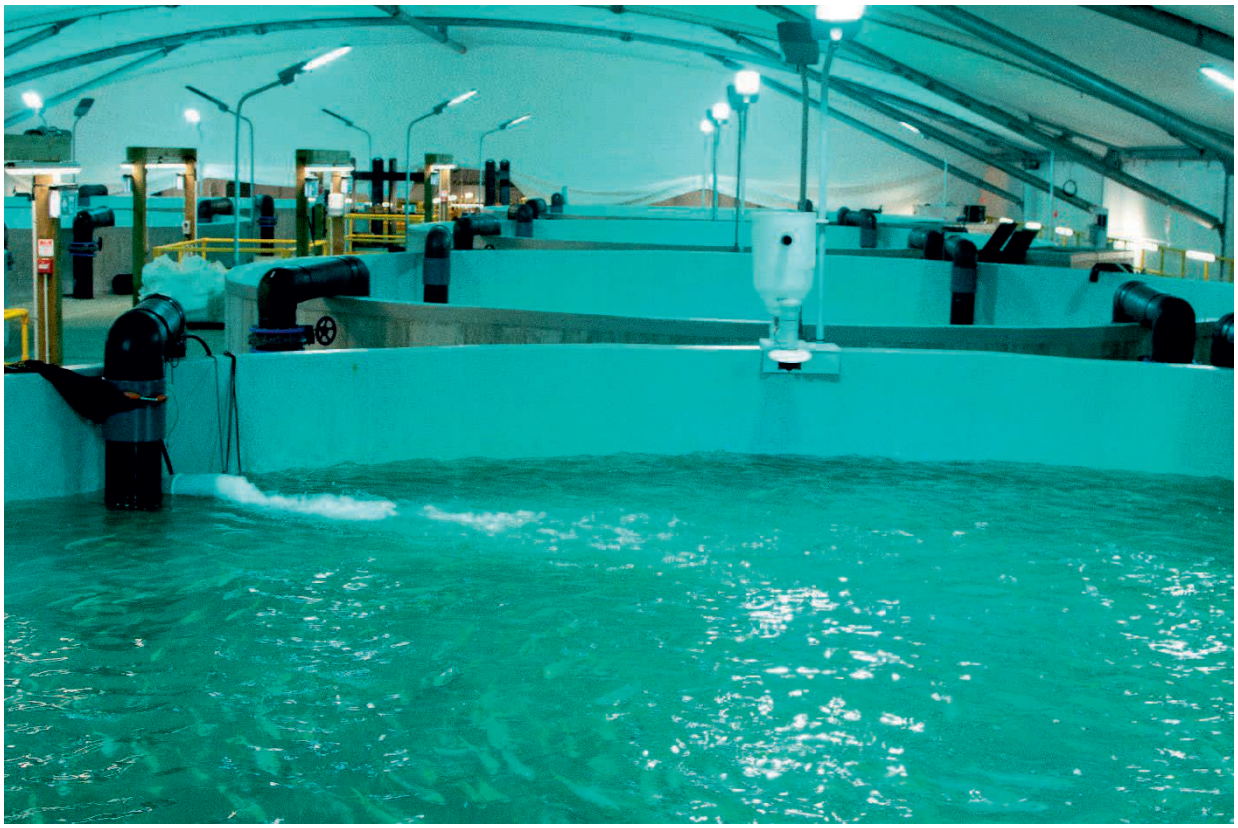
NIWA's mission is to support the wellbeing of Aotearoa New Zealand's people and businesses through effective responses to climate change, improved environmental management, and sustainable use of natural resources.

Our Core Purpose

NIWA's purpose is to enhance the economic value and sustainable management of Aotearoa 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 safety and wellbeing of New Zealanders.

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.



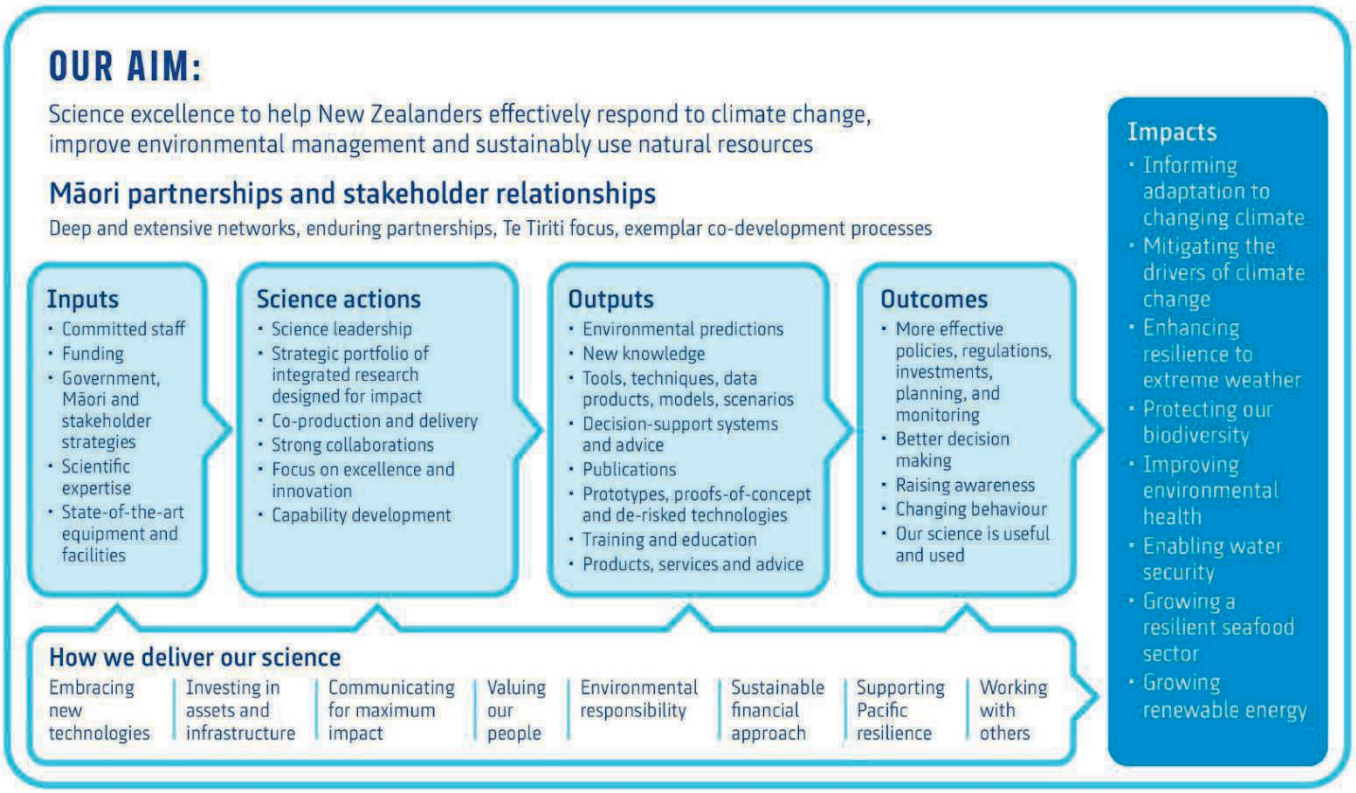
The first of the eight 350,000 litre tanks in the Recirculating Aquaculture System (RAS) at NIWA's Northland Aquaculture Centre was commissioned early in 2023 and now contains about 15,000 kingfish. At that stage, another 25,000 fish in various growth stages were ready for transfer, as the facility is sequentially brought into production. The first commercial-scale harvest is scheduled for October, and the entire facility, when fully operational, will produce more than 600 tonnes of our premium Haku kingfish every year. [Alvin Setiawan]

Strategy for Impact

NIWA aims to help New Zealanders respond to climate change, improve environmental management, and sustainably use natural resources in a way that strengthens our economy and society and achieves the desired collective outcomes. We define our impact as changes in behaviour, decisions, policy and approaches by Māori partners, resource managers and stakeholders informed and supported by our science, that ultimately benefit New Zealanders.

NIWA already has substantial impact in the way it addresses New Zealand's challenges associated with a changing climate and the management of its freshwater and marine resources. In addition to the $105 million the government, NIWA and others invest each year in the research and science infrastructure required to generate new knowledge, more than $75 million per year of NIWA's expertise, information, and services to drive outcomes that deliver impact for the nation is commissioned by other stakeholders. This is a key indicator of the benefit derived from the application of our science.

The framework we use for maximising the potential impact from the application of NIWA's research is outlined in the diagram below. In 2023/24, we aim to increase the focus of our research on the priority science needs of our stakeholders, and increase the application of our research, so the potential benefits of our science are fully realised. This will require ongoing development of our partnerships with Māori and relationships with end users to ensure that the outputs from our research help them deliver the outcomes they are striving to achieve.



Embedding impact

We aim to strengthen the relationships with Māori and stakeholders and provide our people with methods and tools that will help us plan for, monitor progress towards and generate evidence of outcomes and impact. The key principles of an impact 'life-cycle' are:

1. Plan — With stakeholders, develop clear expectations for planned research outcomes and impact (short-term, long-term) against which progress can be monitored. Identify the data required for evidence-based assessments of impact.
2. Deliver — Execute research programmes that are designed for impact. Collect relevant data (including performance metrics) and monitor and evaluate outcomes and impacts.
3. Assess — With Māori and stakeholders, evaluate the attribution of research to planned impacts. Reflect and act on what is learnt from evaluation and reviews.
4. Report — Design fit-for-purpose impact reporting appropriate for audience and accountability. Communicate research impact to stakeholders and explore opportunities for working jointly, with Māori and stakeholders, for improved/ongoing impacts.

NIWA Hamilton – just waiting for signage, landscaping and final fitout, after its dawn blessing on 13 June. The $45 million purpose-built facility will welcome its 130 staff in mid-July, with an official opening scheduled for 4 August. State-of-the-art laboratories occupy most of the ground floor, with office facilities on the first floor and an extensive workshop/store building to the right. [Sarah Fraser]

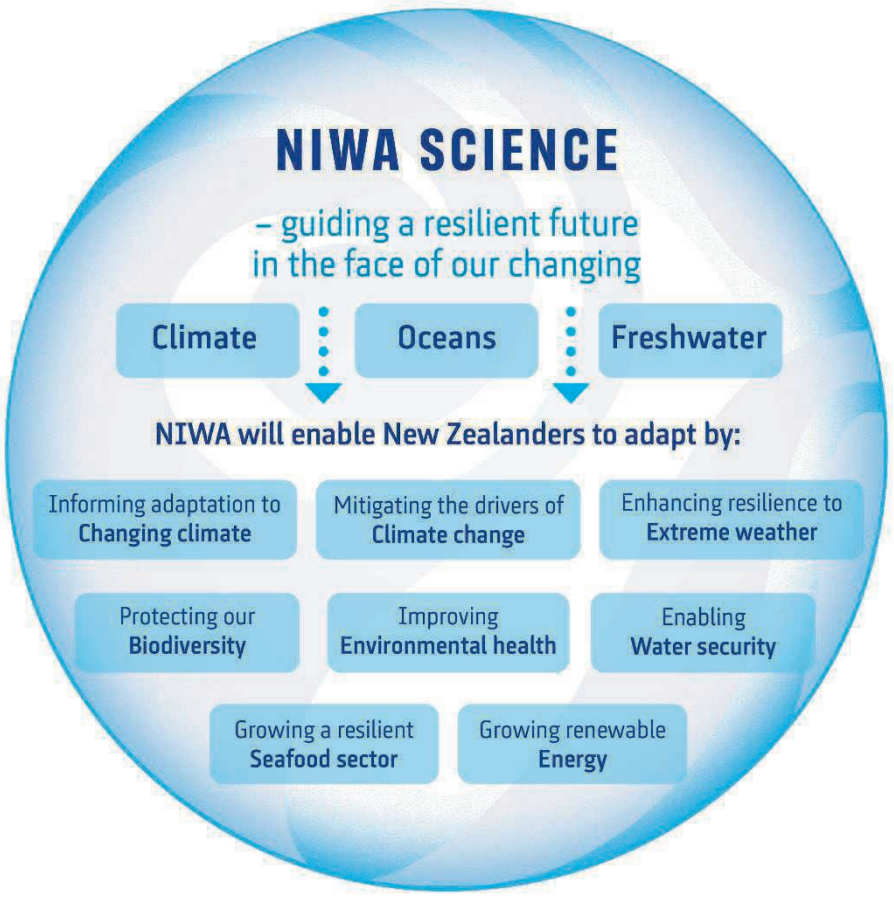
Our Science

NIWA aims to help New Zealanders effectively respond to climate change, improve environmental management and sustainably use natural resources by delivering applied science excellence.

The major and enduring challenge facing humanity is global environmental change. NIWA has a central role in helping Aotearoa New Zealand respond appropriately to our changing climate, our changing oceans and our changing freshwater, including supporting the government's climate change programme, extreme weather responses and related strategies.

The strategy presented here aims to deliver innovative science that increasingly offers solutions to our stakeholders and Māori. This science will be more holistic, more systems-based and more multi-disciplinary. It relies on inter-connected models enabling environmental predictions that are underpinned by an understanding of the underlying processes, observational data and advances in data and social sciences. We must, as well, ensure the right balance across fundamental research and data collection (e.g., long term observations), idea co-development and science that is close to uptake (e.g., decision-support tools, data products).

We will continue to source both crown funding and commercial revenue to deliver the science and services required to contribute to the impact areas described below. The Strategic Science Investment Fund (SSIF) funds our Freshwater Environment, Marine Environment and Climate and Weather Hazards platforms, as well as providing partial support for some key national infrastructure (e.g., RV *Tangaroa*) and databases and collections (e.g., the Climate Database and Water Resources Archive). SSIF funding supports much of our fundamental and underpinning research activities, from which our applied science services are built. Our commercial and applied science services revenue comes from consultancy activities that leverage research and science capability across all of our science to deliver national benefit.



Impacts of our science

1. Informing adaptation to a changing climate

Adapting to present-day and future impacts of climate change is among the greatest challenges of our time. Relationships between greenhouse gas concentrations, temperature changes, wind patterns, sea-level rise, salinisation, ocean biogeochemistry and acidity, rainfall and snowfall, and glacier and polar ice-sheet mass balance are dynamic, complex and compounding. The potential impacts of change on our biodiversity and taonga species; extreme weather events; productive and natural systems; water, energy and food security; air and water quality; human and animal health, built environments and social, cultural and economic wellbeing are just as complex.

NIWA will support New Zealand's adaptation to climate change through a focus on planning for climate change, reducing the adverse effects of climate change on aquatic ecosystems and future-proofing water security.

For 2023–27, we will increase emphasis on:

- Working alongside Māori partners to support adaptation decision making
- Formulating new projections of future climate in New Zealand, including freshwater and ocean state
- Expanding our forecasting to include a broader range of impacts of climate and climate change, especially in relation to seasonal forecasting
- Identifying and quantifying the biophysical, social, cultural and economic impacts of climate variability and change, including extreme weather
- Developing decision-support tools, guidance and methodologies for enabling adaptation
- Formulating adaptation options for iwi/hapū/Māori businesses, stakeholders and communities

Goal	Science Actions
To enable New Zealand to plan for and adapt to the impacts of climate change	• Provide climate projections, including freshwater and ocean state, out to 2100 • Determine and disseminate climate change impacts on extreme weather, including cyclones, floods and drought • Develop and use rapid climate change attribution capability • Refine adaptation pathways and decision-support frameworks, enable their effectiveness in the face of uncertainty and support their uptake • Quantify and share climate change exposure, risks and impacts across multiple environments
To reduce the adverse effects of climate change on aquatic ecosystems	• Better ecosystem management via improved hydrological models of surface and ground water and river and lake temperature responses • Improved planning from determination of impacts of sea-level rise on coastal lowlands and communities • Characterise the impacts of ocean change in a multi-stressor environment on marine ecosystem health and key fish and shellfish species to inform fisheries management • Provide climate projections to inform options and investment decisions for aquaculture development
To future-proof New Zealand's water security from the impacts of climate change	• Develop simulation tools to assess water demand, allocation and use across a range of climate change scenarios • Further develop the New Zealand Water Model for better predictions of the effects of climate change on hydrological processes and water resources

2. Mitigating the drivers of climate change

New Zealand is required to reduce net emissions of all greenhouse gases (except biogenic methane) to zero by 2050 under the Climate Change Response (Zero Carbon) Amendment Act and as set out in the Government's Emission Reduction Plan. This Act also requires a significant reduction in biogenic methane emissions and interim emission budgets along the path to zero carbon. Setting emission budgets and creating, implementing and validating the emission mitigation policies to achieve them, relies on measuring New Zealand's sources of greenhouse gas emissions, the uptake (sequestration) of greenhouse gases and the efficacy of potential mitigation options. Land management decisions that reduce, not exacerbate, greenhouse gas emissions require quantification of the carbon mitigation potentials of urban land management, forest restoration and management, afforestation, pasture soils and coastal ecosystems.

NIWA will support New Zealand's transition to low carbon through a focus on measuring the country's greenhouse gas emissions and quantifying the sequestration potential of our primary production sector, indigenous forests and coastal marine environment.

For 2023–27, we will increase emphasis on:

- Strengthening Māori capacity and capability to respond to climate change risks and impacts
- Verifying greenhouse gas emissions, from global to farm scales
- Quantifying the carbon uptake of indigenous forests, coastal vegetation and through sequestration in marine sediments
- Supporting the development of effective greenhouse gas emissions reduction and sequestration policy
- Advancing New Zealand's interest in the remote sensing of methane through collaboration on the international MethaneSAT project

Goal	Science Actions
To enable the reduction of agricultural greenhouse gas emissions in New Zealand and globally	• Develop and validate methods to measure greenhouse gas emissions, from global to farm scales, and promote their use • Lead the international MethaneSAT space mission to locate and quantify, at high resolution, methane emissions worldwide, to enable urgent action to reduce emissions • Attribute contributions to greenhouse gas emissions from different land uses, including wetlands • Assess effectiveness of emissions reduction management approaches or policy • Maintain and disseminate high-precision, long time-series observations of key atmospheric gases, supporting global science and diplomacy efforts to reduce greenhouse gas emissions
To quantify and promote greenhouse gas uptake and sequestration in New Zealand	• Better quantify carbon uptake and sequestration of New Zealand's indigenous forests, assess potential impacts of climate change on carbon flux by native trees and promote the use of this understanding to improve New Zealand's carbon accounting • Co-develop decision-support tools and implementable plans with Māori partners and stakeholders to promote low emission approaches • Investigate the impact of pest control on carbon uptake by mature indigenous forests to optimise synergies of policies • Measure sediment flux in coastal and marine environments to determine the potential for carbon sequestration

3. Enhancing resilience to extreme weather and ocean hazards

With the rising frequency and severity of climate- and weather-related hazardous events, the risk of natural hazards in New Zealand and around the world is increasing. The impacts of these events are compounded by population and asset growth. New Zealand has committed to adopt a 'whole of society approach' to implement the Sendai Framework for Disaster Risk Reduction by reducing the underlying risk factors that create disasters. This requires improved predictions of the hazards and threats we face (floods, droughts, wildfires, sea-level rise and storm surge, tsunamis, and subaqueous landslides) and improved measures of our exposure and vulnerability to them with respect to our communities, economy and environment. New Zealand's National Disaster Resilience Strategy is framed around Treasury's Living Standards Framework, with the vision of being a disaster-resilient nation that acts proactively to manage risks and build resilience. It outlines the need to recognise that, while the future is uncertain, major, unexpected and hard-to-predict events are inevitable. Moreover, the further we probe into the future, the deeper the level of uncertainty we encounter. This is particularly so with respect to climate change risks.

NIWA seeks to enhance New Zealand's resilience to hazards by developing predictive models and tools to better plan and prepare for extreme weather and ocean hazards.

For 2023–27, we will increase emphasis on:

- Strengthening Māori capacity and capability to respond to climate change risks and impacts
- Enhancing predictive models of weather-related hazards delivered to end users via an operational multi-hazard forecasting system that includes ensemble-based forecasts to determine levels of uncertainty
- Validating our national flood flow and inundation forecasting tool for all high priority regions
- Improving magnitude/frequency relationships for submarine, coastal and land-based hazards to allow for better spatial planning and adaptation
- Delivering a web-based, multi-hazard, risk-modelling platform

Goal	Science Actions
To provide accurate forecasts of extreme weather events and their impacts	• Advance 24/7 operational multi-hazard ensemble forecasting services, especially impact-based forecasts of extreme weather and climate • To accelerate development of New Zealand's flood and innovation forecasting capability • Expand the use of RiskScape as an all-hazards platform, both within New Zealand and the wider Pacific • Develop rapid portability of very-high-resolution weather-hazard forecasts to provide critical information for decision making during extreme events on the areas experiencing high impact • Work with the UK Met Office to transition to the next AI-enhanced generation of global weather and climate modelling, providing New Zealand access to the world's best forecasting capability • Work with Māori business to develop bespoke decision-support tools to mitigate and plan for severe weather events impacting their sectors
To enhance resilience to submarine and coastal hazards	• Develop AI systems to identify rip currents from beach images, aerial and satellite photographs, improving public safety • Predict changes to the tidal cycle under variable global sea-level rise scenarios to improve infrastructure planning • Support development of GNS Science's National Seismic Hazard Model by contributing offshore fault and eruption risk information • Quantify the impacts of an extreme rainfall event (Cyclone Gabrielle) on marine flora and fauna

4. Protecting our biodiversity

With about 410,000km of freshwater systems and a marine estate more than 21 times the area of our land, understanding how to protect New Zealand's unique aquatic biodiversity is a major challenge. Our biodiversity is of immeasurable value to all New Zealanders, and for Māori, the health of Papatūānuku, our ecosystems, taonga species and the wellbeing of whānau, hapū and iwi are interconnected. Yet our marine and freshwater ecosystems, habitats and the biodiversity they support continue to be degraded. For many aquatic species there is insufficient information about their status. The restoration of taonga species, degraded cultural values, and freshwater and marine socio-ecological systems are key elements of Te Tiriti o Waitangi settlements. Māori are seeking the knowledge and tools required to restore degraded ecosystems and associated taonga.

NIWA will support caring for our unique biodiversity by enhancing biodiversity protection, developing better methods for measuring and monitoring biodiversity and protecting aquatic ecosystems from invasive species.

For 2023–27, we will increase emphasis on:

- Safeguarding taonga species, aquatic environments, mahinga kai and Māori livelihoods
- Measuring and monitoring aquatic biodiversity
- Detecting and controlling invasive species

Goal	Science Actions
To better protect and restore New Zealand's biodiversity	• Measure the ecological functions and values provided by biodiversity and biogenic habitats, including how they support New Zealand's fisheries • Work with Māori to co-develop maps of habitats to support cultural outcomes and deliver key ecosystem functions and services • Develop decision-relevant tools to anticipate the impacts of climate change on aquatic biodiversity and promote their use
To improve monitoring and management of aquatic biodiversity and significant habitats	• Develop and disseminate new, technology-based methods to survey and map biodiversity and key ecological habitats to increase data quality and coverage for decision making • Work alongside iwi, hapū and Māori researchers to develop and apply methods to assess mahinga kai • Develop modelling and visualisation tools for biodiversity and ecologically significant habitats to support spatial planning and management
To protect our aquatic environment from pests and diseases	• Partner with whānau, hapū and iwi to develop and apply methods that protect our aquatic environment from pests and diseases • Develop and apply smart and sensitive surveillance and diagnostics systems to reduce response times and costs for aquatic pests and diseases • Co-develop low-impact, culturally acceptable methods for responding to, eradicating and controlling pests and diseases in aquatic environments and promote their use.

5. Improving environmental health

A healthy environment is central to the New Zealand economy, and to the way of life and the physical and emotional wellbeing of all New Zealanders. For Māori, our natural environment – te taiao – is linked to whakapapa. Te Oranga o te Taiao (the National Strategy for Biodiversity) describes the importance of the health and wellbeing of te taiao for current and future generations. Our atmosphere, freshwater and marine ecosystems all show variable trends in condition. Mātauranga Māori-driven monitoring practices have tracked a decline in the cultural health of our waterways and ecosystems. To protect and, where necessary, restore New Zealand's environments we need robust frameworks that support the measurement and monitoring of ecosystem condition to establish thresholds ('limits') and inform restoration, to ensure the benefits they provide are available for future generations.

NIWA will support Te Oranga o te Taiao by developing systems to facilitate State of the Environment reporting and the requirements of the proposed National Planning Framework for natural resource management, providing the scientific basis for establishing environmental limits and targets, and developing approaches to restore degraded aquatic habitats.

For 2023–27, we will increase emphasis on:

- Ensuring that Māori have the knowledge and tools to restore degraded ecosystems and associated taonga
- Establishing environmental limits and targets
- Restoring degraded aquatic ecosystems

Goal	Science Actions
To improve environmental health reporting	• Provide robust long-term environmental monitoring required for State of Environment reporting and the National Planning Framework • Develop and implement innovative observational programmes and networks, including adopting new sensor technologies, for key environmental indicators in our freshwater and marine environments • Develop and use spatial reference datasets (e.g., digital river network) to enable science, spatial products and response to extreme events
To support the establishment of environmental limits and targets	• Develop and apply predictions of estuarine and marine ecosystem response to cascading environmental stressors associated with different land uses, climate change and habitat loss • Develop and apply analytical tools and models to trace the source of sediments in aquatic systems, to identify and target measures for erosion control • Develop simple methods for calculating sediment load limits for plan rules to meet estuarine health targets • Work with forest industry partners and government to predict the impacts of plantation forest harvesting on sediment loss to rivers and coastal zones to improve management practices
To restore and rehabilitate degraded aquatic ecosystems	• Co-develop and apply new best practice with Māori to restore aquatic ecosystems and their associated cultural values • Develop procedures to maintain endangered aquatic plant species in culture, in preparation for restocking previously degraded habitat • With industry partners, design and test the performance and cost-effectiveness of pollution mitigation systems in rural and urban landscapes • Build capability in industry and communities by developing and sharing best practice in riparian planting

6. Enabling water security

Water security – the availability of sufficient quality water to support human and environmental health and livelihoods into the future – is a global concern. In New Zealand, there are emerging conflicts about the best uses of our limited water resources, especially in relation to irrigation, hydropower generation, and the stream flows required to support aquatic ecosystems and cultural values. Frequent boil-water notices and beach closures, and periodic water-borne disease outbreaks indicate the vulnerability of drinking water supplies and recreational water to contamination. Similarly, widespread algal blooms and biodiversity declines in aquatic ecosystems demonstrate vulnerability to water quality degradation and hydrological alteration. Finally, destructive hydrological events, such as floods and droughts, are increasing as a consequence of climate change. All these events and conflicts are symptoms of water insecurity in New Zealand.

Water security is a multifaceted problem that encompasses public health, economic productivity, food security, natural hazards management and ecosystem health, among other issues. NIWA is uniquely placed to deliver the multidisciplinary science approaches needed to provide the information and tools required to maintain and improve different aspects of water security, working with partners including iwi and hapū, regional and national government and a range of sector groups, especially agriculture, conservation, energy, public health and water treatment.

NIWA will support the work of partners and stakeholders in water security by focusing on the development of water management and decision-support tools. Foremost among these are the predictive models and associated simulation tools needed to assess alternative water use scenarios and manage the inevitable trade-offs between competing uses.

For 2023-27 we will increase emphasis on:

- Predicting and developing methods for adapting water use and river flow management to long-term environment changes
- Developing pollution mitigation systems for urban and rural landscapes, and incorporating mitigation systems in models for planning and policy making
- Developing adaptable models to identify land-use scenarios that protect aquatic ecosystems

Goal	Science Actions
To improve water allocation decisions and water resources management	• Develop and promote application of hydrological models and decision-support tools for water resources planning and decision making • Identify potential new locations for water storage and hydropower systems • Develop, evaluate and provide guidance on alternative water allocation frameworks
To enable sufficient water flows to meet cultural values, biodiversity and ecosystem process needs	• Support Māori partners to assess their cultural, environmental and economic water flow requirements • Develop flexible, reliable models for predicting water flow requirements for a range of ecosystem health indicators
To support land management and wastewater treatment that protects human and ecosystem health	• Develop integrated catchment-ecosystem models that predict the effects of alternative land-use scenarios on aquatic ecosystems • Develop affordable and culturally appropriate wastewater treatment methods • Develop design standards, performance models and guidance for urban and agricultural pollution mitigation systems

7. Growing a resilient seafood sector

New Zealand's seafood industry plays a key role in the country's economy, contributing about $2 billion in export earnings and employing more than 13,000 people. The sector provides New Zealand and the world with high quality nutritious seafood. But the sector faces significant challenges, specifically maintaining sustainability, maximising market value, securing social licence to operate, and ensuring resilience in the face of environmental change. Climate change-related effects such as ocean acidification and warming, as well as species migration, potentially have huge implications for the industry. Māori hold significant commercial and customary fisheries interests across New Zealand and are uniquely placed to benefit from, and be impacted by, environmental change.

NIWA research and applied science services underpin the industry by monitoring and assessing fish populations and communities to inform catch quotas, increasing the operational efficiency of catch systems, identifying and mitigating the environmental and biological risks of fishing, and developing high-value aquaculture species and associated production systems. Application of new technology and mātauranga, in partnership with Māori, will provide significant development opportunities for whānau, hāpu, and iwi and provide potential to grow their seafood businesses while sustaining healthy seas for future generations.

NIWA's science effort supports a resilient, sustainable, and increasingly productive seafood sector via three areas of focus: advancing sustainability, diversifying aquaculture and increasing resilience to environmental change.

For 2023–27, we will increase emphasis on:

- Providing tools and services to advance the sustainability of the seafood sector
- Demonstrating commercial-scale, land-based aquaculture of finfish
- Developing tools and guidance for industry to mitigate the impacts of a changing climate
- Partnering with Māori to advance their interests, participation and aspirations in the aquaculture and fisheries sector

Goal	Science Actions
To enable sustainable fisheries management	• Develop and apply new tools, advice, and methods to assess and monitor fish populations and communities, and to describe impacts of fishing activity and environmental change to improve fisheries management decision making • Partner with Māori to support their long-term sustainability goals • Increase understanding of biological processes and apply it for better single-species management
To diversify New Zealand's aquaculture sector by demonstrating commercial-scale, land-based culture of yellowtail kingfish	• Expand production of the market size haku (yellowtail kingfish) to 600 tonnes per annum via NIWA's newly commissioned experimental commercial-scale recirculating aquaculture system (RAS) to demonstrate the economic and operational feasibility of land-based finfish farming • Maximise the quality and production of haku through ongoing broodstock, nutrition and systems development • Develop and apply approaches that increase the productivity of existing cultured species and the feasibility of culturing new species • Work alongside iwi, hapū and Māori to explore the feasibility of culture or enhancement of target species
To increase the resilience of New Zealand's seafood sector in the face of environmental change	• Develop and promote the implementation of smart surveillance and diagnostic systems for emerging biosecurity threats and co-develop solutions to manage the impacts of harmful pests and diseases • Develop and promote Ecosystem-based Fisheries Management, which incorporates climate change impacts on fisheries and marine ecosystems • Partner with Pacific Island fisheries agencies and key stakeholders to diversify fisheries and improve food security in the Pacific • Increase knowledge of storm impacts (e.g., sediment, carbon and pollutants) on the oceans and fisheries habitats to inform decision making and event recovery • Develop climate impact predictions for marine heatwaves and other extreme events through AI and modelling systems

8. Growing sustainable renewable energy

New Zealand relies upon a diverse mix of energy sources with a high proportion of renewables that currently provides a relatively secure energy supply. But New Zealand's energy needs are projected to increase as the responses to and the impacts of climate change become more pronounced. The government has committed that by 2035 half of our total energy consumption (was 40% in 2021) will be from renewable sources, and that New Zealand will have 100% renewable electricity by 2030 (was 82% in 2021). They are developing an energy sector decarbonisation roadmap to this end. Māori have an important role to play in developing the future energy makeup of New Zealand and are integral as partners in NIWA's approach to this sector. A mātauranga Māori-informed approach to energy systems and security can help build energy resilience in both infrastructure and communities.

Increasing the share of renewable energy, from proven technology for wind, solar and hydro, to innovations in other renewable energy sources, such as wave and tidal energies, requires in-depth knowledge of these energy sources and possible environmental impacts and mitigation options for development. Resource models need to account for changing weather patterns, data that is best provided by climate change model projections downscaled to individual development sites. Natural hazard risks from winds, floods, snow, land instability and ocean state, are all expected to increase under a future climate, so need to be considered across existing and future energy infrastructure. Building new generation and energy storage systems remains a significant challenge, and their environmental impacts are varied and complex.

NIWA's unique climate, weather, and oceans forecasting capability, combined with our broad environmental expertise, enables us to provide the critical environmental information needed for robust decision making by industry, legislators and environmental managers on a pathway to a resilient and decarbonised energy system and network.

For 2023–27, we will increase emphasis on:

- Supporting the development of a diverse renewable energy portfolio for New Zealand
- Improving climate forecasting for solar, wind and hydro renewable energy resources
- Improving baseline understanding of the environmental impacts of new renewable energy developments
- Building partnerships with Māori to support their aspirations in the energy sector

Goal	Science Actions
To accelerate growth of New Zealand's renewable energy	• Assess and disseminate future renewable energy generation and storage options • Develop and promote uptake of new renewable energy technologies • Support small-scale, multi-source power schemes for rural communities
To enable energy infrastructure resilience under climate change	• Test future scenarios of electricity generation (e.g., pumped hydro), demand and transmission against future climate change scenarios • Advise infrastructure companies on hazard, risk and resilience • Leverage AI to deliver datasets and tools for electricity generation and its optimisation • Work alongside Māori researchers to understand socio-cultural risks and impacts of electricity generation under a changing climate
To minimise the environmental impact of the energy sector	• Provide best practice advice to existing and new renewable energy operations • Develop and promote uptake of approaches that reduce the environmental impacts of electricity generation • Develop and apply models and data services to help hydropower companies design environmentally sustainable water flow regimes • Support the development of the offshore wind industry through the provision of environmental assessment and impact services • Work alongside Māori partners to advise on methods to reduce the environmental impacts of electricity generation

CLIMATE SCIENCE

New Zealand's pre-eminent provider of atmospheric and climate science

230

Science Staff

New Zealand's largest team of climate scientists

$42M

Annual Investment

In weather and climate research

6,500

Climate Stations

The National Climate Database with information from 6,500 climate stations covering New Zealand, South-West Pacific and Antarctica

$18M

Supercomputer

Enabling precise, highly localised forecasts

50,000

National Flood Forecasting Service

Providing river flow forecasts for 50,000 catchments nationwide

- Climate change and variability
- High-precision weather forecasting
- Weather-related hazard forecasting
- Adaptation and mitigation

FRESHWATER SCIENCE

Supporting the sustainable management of our freshwater resources

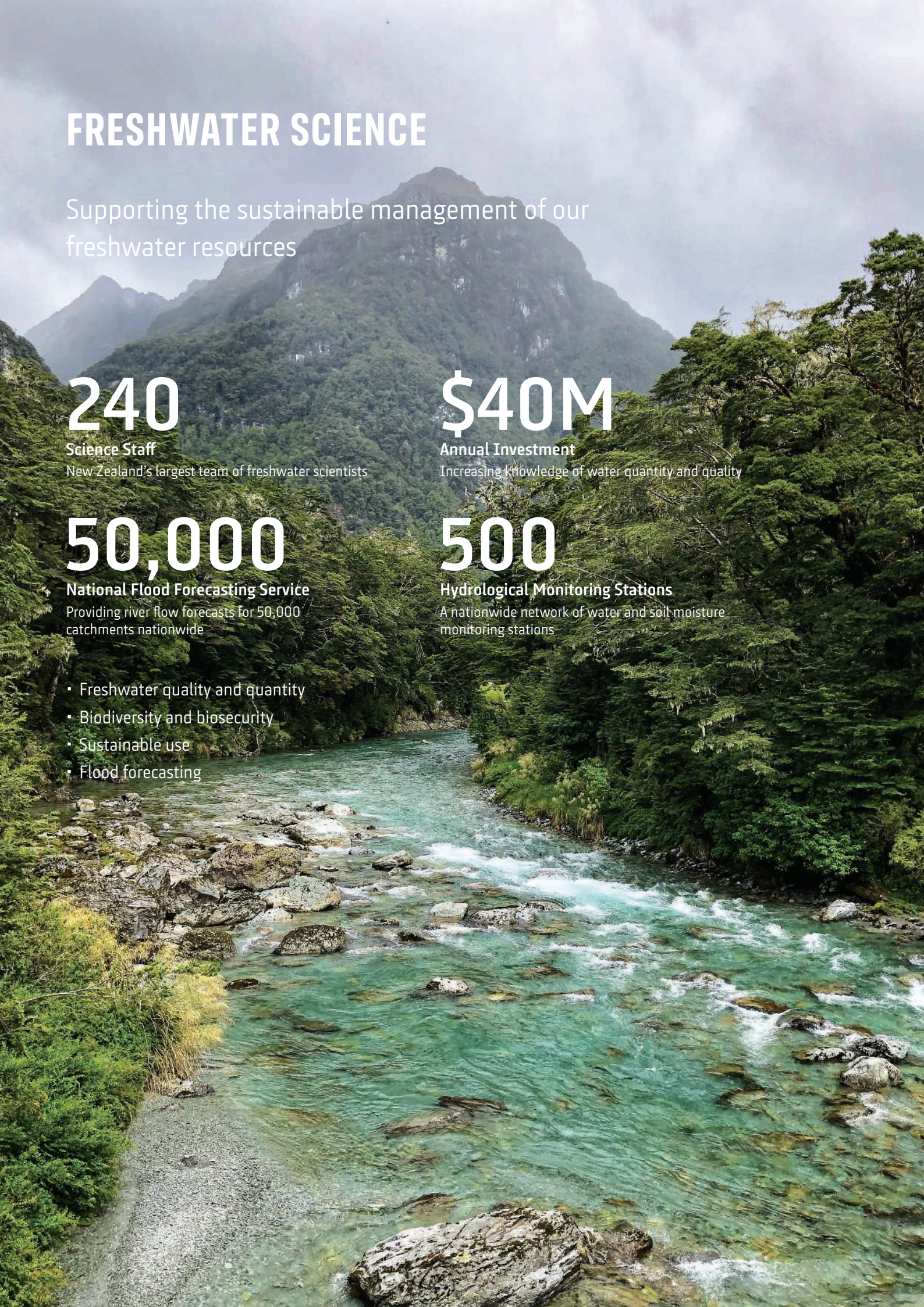
240
Science Staff
New Zealand's largest team of freshwater scientists

$40M
Annual Investment
Increasing knowledge of water quantity and quality

50,000
National Flood Forecasting Service
Providing river flow forecasts for 50,000 catchments nationwide

500
Hydrological Monitoring Stations
A nationwide network of water and soil moisture monitoring stations

- Freshwater quality and quantity
- Biodiversity and biosecurity
- Sustainable use
- Flood forecasting



MARINE SCIENCE

Understanding, managing and maximising the benefits of our marine estate

260

Science Staff

New Zealand's largest team of marine scientists

$67M

Annual Investment

In coast and ocean, fisheries and aquaculture science

Northland Aquaculture Centre

New Zealand's leading science facility for finfish aquaculture Recirculating Aquaculture System targeting 600 tonne commercial-scale production of kingfish in 2023–24

State-of-the-art research vessels

Supporting the New Zealand science community

- New Zealand's marine estate
- Sustainable use of marine resources
- Biodiversity and biosecurity
- High-value finfish aquaculture

Enablers – supporting the delivery of our science

To deliver the science needed to achieve the desired impacts for Aotearoa New Zealand, NIWA will partner with Māori, work effectively with others, embrace new technologies, invest in quality assets and infrastructure, support Pacific resilience, communicate for maximum impact, put our people first, take environmental responsibility, and ensure a sustainable financial approach.

1. Partnering with Māori

NIWA aims to have enduring partnerships with Māori, as a trusted research partner, that deliver impactful and relevant research that is co-developed, supports kaitiakitanga and enhances the social, cultural, environmental and economic outcomes of benefit to whānau, hapū, iwi, Māori communities and Māori businesses.

Strengthening NIWA's partnership approach to working with Māori is, and has always been, a key priority for NIWA. We take a values-based approach to developing and strengthening the organisation's networks with whānau, hapū, iwi, Māori business and Māori communities and work together to co-develop research priorities and use Māori knowledge and methodologies where appropriate to deliver relevant and impactful research that works towards positive outcomes of benefit to Māori.

Whilst engagement with Māori happens across all levels of the organisation, we have dedicated Māori leadership roles across our executive, science and operations management, and across our regional sites to ensure that NIWA continues to:

1. grow organisation-wide cultural competency and awareness to engage with Māori with confidence
2. grow Māori research capability and capacity to lead (or support) the delivery of Māori-centric or Māori-led research projects
3. grow pathway's for rangatahi Māori into further education or science careers
4. strengthen NIWA responsiveness to the Vision Mātauranga policy across our science programmes
5. ensure that Māori-driven strategic research is prioritised and research projects are successfully delivered to the satisfaction of our Māori partnerships
6. strengthening our understanding of our obligations and expectations as a Te Tiriti partner

Research Highlight: Toitu Ngā Taonga Wai Māori

Over the next five years, we will deliver the 'Toitu Ngā Taonga Wai Māori: Cultural keystone species, Māori livelihoods and climate change' project. Launched in October 2022, this is a large MBIE Endeavour Fund research programme involving more than ten hapū and rūnanga partnerships across New Zealand. This programme will provide the climate change vulnerability assessments and predictive decision-support tools needed to support the management of cultural keystone species, and the place-based cultural practices, knowledge systems and livelihoods of iwi/hapū/whānau.

The research responds to a diversity of Māori voices and research needs to deliver new transferrable approaches drawn from multiple knowledge systems. The project deeply considers the impacts of climate change on social and economic dimensions, particularly on cultural practice, identity and iwi/hapū/whānau wellbeing. The project is led by an extensive Māori team, working with partnerships across New Zealand to identify the impacts we cannot avoid and co-design interventions to respond, strengthening resilience of whānau livelihoods, cultural practices and cultural keystone species.

PARTNERING WITH MĀORI

Te Kūwaha – the National Centre for Māori Environmental Research a dedicated Māori research team, working with others to enable knowledge systems to support kaitiakitanga and provide environmental research excellence that enhances the social, environmental and economic aspirations of whānau, hapū, iwi, Māori communities and Māori business

22 Māori scientists and researchers delivering outcomes for Māori, with Māori, by Māori

50

partnerships and collaborations with Māori across Aotearoa New Zealand

26

Māori-driven and/or Māori-related NIWA projects working with whānau, hapū, iwi, Māori entities and Māori communities to realise their research aspirations

7

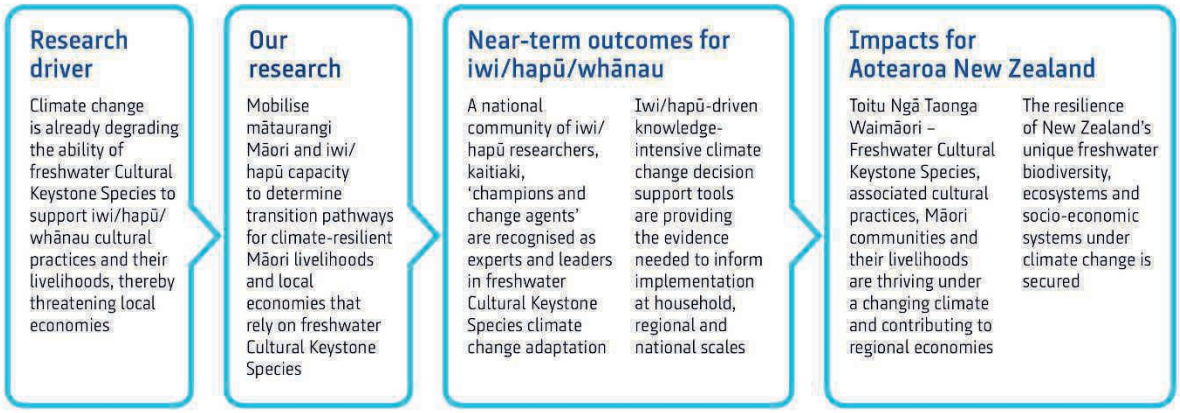
Māori staff in senior leadership positions integrated across NIWA's science, operations and cultural functions

4

Strategic Science Investment Fund (SSIF) programmes to deliver research outcomes for Māori in freshwater, coastal environment, fisheries, aquaculture, climate, natural hazards and economic development, as well as Māori research capability development and creating a Te Tiriti roadmap for NIWA.

We provide:

- **Targeted science communication and outreach –** which builds science literacy and capacity within whānau, hapū, rangatahi, kaitiaki, marae and Māori communities
- **Graduate Internships –** which create pathways to support Māori science graduates into postgraduate opportunities and career pathways
- **Māori research capability and support –** via summer internships, MSc and PhD scholarships, taiohi wānanga, supervisory arrangements and VMCFs
- **Organisational cultural capability development –** via customised learning tools and resources targeted at supporting staff to strengthen their individual cultural capability (digital apps, noho marae, tikanga/te reo support)

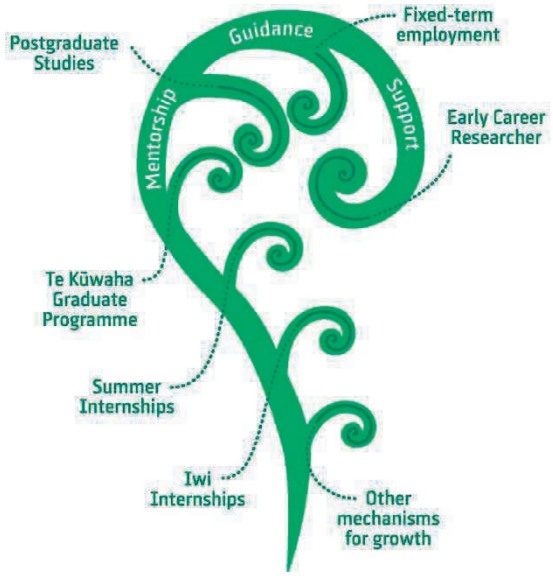


The Toitu Ngā Taonga Wai Māori programme seeks to mobilise a national community of iwi/hapū researchers, kaitiaki, 'champions and change agents' to provide the decision-support tools needed by Māori to lead the local, regional and national strategies and workforces required to secure the resilience of New Zealand's freshwater biodiversity, ecosystems and communities under a changing climate.

Building Māori Research Capability

NIWA aims to attract and retain the best Māori talent as a magnet for science career and development pathways.

To support this long-term aspiration, NIWA has been committed to and invested in building Māori research capability and capacity. Te Kūwaha (NIWA's Māori environmental research unit since its inception in 2001) is currently set up as both a National Science Centre (one of eleven) responsible for science delivery for the benefit of New Zealand, and a cross-functional unit responsible for executing organisational strategy. Te Kūwaha is a unique team of NIWA researchers and leaders that combine scientific expertise with mātauranga Māori in accordance with tikanga Māori. They work at the interface of knowledge systems to generate fit-for-purpose methodologies, tools and products required by Māori as kaitiaki, resource owners, managers and decision makers. One of NIWA's key priorities is to develop the next generation of Māori scientists in our workforce. 'Te Piko o te Māhuri, Tērā te tipu o te Rākau' is a development initiative that provides pathways and freshwater and marine platforms. This whakataukī speaks to the nurturing of a new shoot to allow it to grow to its full potential. In the same way, Te Kūwaha provides opportunities to nurture and grow new Māori research talent at NIWA, and across the science sector. Te Piko o te Māhuri recognises that Māori research talent can enter the programme at different stages of their career, and each individual's growth needs will vary. As such, the programme can tailor the best pathway fit for their needs and growth.



Te Piko o te Mahuri, Tērā t+e tipu o te rākau – The way in which the young sapling is nurtured determines how the frond will grow.

WORKING WITH OTHERS

enhancing our collaborations with

- Māori
- national and international science organisations
- customers and stakeholders

to deliver the excellent science New Zealand's needs

48
collaboration projects contracted with other CRIs

1,075
science projects with more than 100 contracted customers/stakeholders

110
collaboration projects contracted with universities

23
contracted formal agreements with international organisations

116
PhD, MSc or Honours students supervised annually

- Joint CRI Cyclone Gabrielle recovery taskforce to support recovery and better preparation for future extreme events
- Joint CRI COVID-19 Recovery Taskforce to support New Zealand's recovery
- Promoting science as
  - Principal Science Partner of BLAKE
  - Major sponsor of national Science & Technology Fairs

2. Working with others

NIWA seeks to continually enhance our collaborations with Māori, other CRIs, national and international science organisations and stakeholders to deliver excellent science that meets Aotearoa New Zealand's needs.

Typically, more than 90% of the science we produce, either research or commercial and applied science outputs, is carried out with people from other organisations. This very high level of collaboration has benefited us, our partners and the work we do, and we will maintain our focus on enhancing these relationships. Our Māori partners and stakeholders are at the very centre of our 'Strategy for Impact', and we continually promote collaboration for the greater benefit of our customers and New Zealand as a core NIWA value.

There are two main reasons collaborative approaches are appropriate. First, multi-disciplinary science that covers the environmental, economic and social domains is fundamental to solving national and global environmental challenges. Second, co-development of products and services with those who will use them is often essential to ensure our science is of use and is used. Taking the 'best approach' with the 'best team' demands strategic partnerships and collaborations that bring together expertise, technologies and communities of interest to solve New Zealand's problems.

NIWA is working to deliver on the promise for the New Zealand science sector that is described in the Te Ara Paerangi White Paper. Driven by New Zealand's science needs, and by the direction of government policy, we regularly bring together research providers and end users. A good example of this is our response to the Wellington Science City initiative. NIWA, with Victoria University of Wellington (VUW), led the development of a strong proposal for a Centre of Climate, Oceans and Hazards at Greta Point in Wellington. By co-locating the core capability in these areas, with or close to the organisations that rely on the science, we will create a step change in the effectiveness and efficiency of science investment and activity, leading to improved outcomes for the New Zealand public. We look forward to progressing this initiative with our Centre partners of VUW, GNS Science, Massey University, and our 'next user' community over the coming years. Another example is our efforts to increase national resilience to natural hazards, especially extreme weather and climate events, via the RiskScape partnership between NIWA, GNS Science, and Toka Tū Ake EQC, the Earthquake Commission.

Some of NIWA's most valuable partnerships are with other CRIs. We actively and regularly work with the Te Ara Putaiao (CRI Māori Leadership Group), People & Capability, Health & Safety, Operations, Strategy & Policy, Technology & Innovation and Communications & Marketing teams of the other CRIs through regular meetings where information is shared, and common opportunities and challenges are discussed. There are multiple outputs from these joint discussions, such as the recent Science New Zealand perspective on Te Ara Paerangi – Future Pathways. The high level of cooperation, resource-sharing and development of joint initiatives across the CRIs provides significant benefit for New Zealand; for example, the NIWA co-led National Environmental Data Centre that provides easy access to CRI environmental data sets. The close relationships CRIs have with government agencies, both individually and collectively, enable NIWA and the CRI sector to be very responsive to government needs. For example, the rapid response of the science sector to Cyclone Gabrielle – before, during and after the event – would not have been possible without the high degree of cooperation and collaboration that is now the norm among CRIs.

In addition to such strong pan-CRI initiatives, NIWA has multiple ongoing research partnerships with other CRIs; for example, support of the tsunami buoy warning system (with GNS Science), quantifying carbon sources and sinks and hydrological model development (GNS Science, Manaaki Whenua), future trawl design (Plant and Food Research), erosion control and ecosystem-based management (Manaaki Whenua) and national biosecurity (Plant and Food Research, AgResearch, Manaaki Whenua and Scion).

Leveraging its strong reputation for science excellence, NIWA has established enduring partnerships and collaborations with leading international research and technology organisations (e.g., the United States National Oceanic and Atmospheric Administration and the United Kingdom Met Office) and New Zealand universities.
Our delivery of relevant, useful science has led to strong collaborations with Māori and the key sectors our science supports.

We will use these relationships to:

- Ensure our science focuses on the priorities, and meets the needs, of Māori, communities and the sectors we serve
- Deliver knowledge, products and services derived from our research
- Provide access to critical national science infrastructure we own and support
- Develop the science capability the nation needs in a rapidly changing world
- Contribute to and leverage the expertise, knowledge and technologies developed by others

We will enhance our partnerships, relationship, and collaborations with:

- The other CRIs to strengthen the collective approach to sharing resources and capital investments, strategy development, co-location, stakeholder engagement and giving effect to Te Tiriti o Waitangi obligations and expectations
- Central and local government agencies (including staff secondments)
- Māori researchers, tribal authorities and businesses to help them build science capacity and meet their science priorities
- Key business sectors to better understand their issues and opportunities and work together on solutions
- Universities to expand our research skills and help build capability through Joint Graduate Schools, Centres for Excellence and joint appointments
- International weather and climate science organisations to improve the accuracy of weather forecasts and climate projections, especially through membership of the UK Unified Model Partnership
- BLAKE (The Sir Peter Blake Trust) to promote an awareness among future leaders of the environment and the opportunities that science provides
- International science organisations involved in joint global marine and climate research initiatives
- National e-Science parties to provide high-performance computing to the wider science community

Investigating snapper mortality in the recreational fishery by keeping undersize discarded fish for five days in netted enclosures after they had been line caught by recreational fishers. This NIWA-led, Fisheries New Zealand-funded project in the Bay of Islands is being carried out in collaboration with Ngāti Kuta and LegaSea. [Stuart Mackay]

3. Embracing new technologies

NIWA aims to develop and adopt innovative technologies for better products and services that deliver impact.

The accelerating growth in artificial intelligence and technology is having a profound impact on research and applied science, offering new opportunities, but also increasing some risks (e.g., cyber security). The list of new technology benefitting NIWA science is long: data science, machine learning, predictive modelling and computer vision, sensor technology, remote sensing, industrial 3D printing, instrument miniaturisation, 'intelligent edge' computing, big data, high-performance and quantum computing and augmented reality technologies. All are making (or will make) scientific data capture, modelling, analysis, and the communication of our science, more effective, more efficient and, importantly, more accessible to sectors, communities and markets. Some technologies, such as AI and quantum, will enable science to transcend physics-based limitations or barriers to modelling and application into complex digital twins.

We are deliberate in investigating and, where beneficial, developing and adopting state-of-the-art technologies, because it enables us to deliver more impact, faster, to a wider range of customers. Sustainability and environmental concerns (e.g., resilience under a changing climate) are increasingly influencing policy and business decisions. Such decisions benefit from use of technology enabling further elucidation of the issue and potential solutions. Commercial primary industries, finance, and insurance sectors, for example, are applying predictive environmental modelling technologies provided by us to complex business decisions that are increasingly influenced by global environmental change.

NIWA aims for business-wide technology integration of information technology with environmental engineering/mechatronics, environmental information systems and services, data science and high-performance computing capabilities. Through this integration, we are building our data science capabilities to enhance our operations and science, and accelerating our uptake of new AI technologies across the company. For example, we are launching cloud-centric IT architecture and upscaling our cyber threat detection and disruption protection capability, reducing NIWA's cyber and security risk profile and securing our data and systems with industry-leading technology and processes. We are also providing easy-to-use and accessible highly complex AI tools via our high-performance computing infrastructure to remove barriers to uptake by non-data scientists, facilitating adoption of cutting-edge technology across the organisation.

NIWA national and international partnerships for data collection and delivery are producing significant data infrastructure developments, data sovereignty and custodianship transformation with Māori, government agencies, the private sector and other CRIs. Investment in environmental engineering/mechatronics leads to novel and more efficient data collection and processing capabilities. NIWA is advancing Aotearoa New Zealand's eResearch via our capital investments and ongoing contribution to the operational expenditure of the NIWA High-Performance Computing Facility (HPCF). As part of that, we are scoping the ongoing upgrade pathways for the HPC to meet future needs.

To enhance adoption and use of state-of-the-art digital technology, and in support of New Zealand's eResearch community, we will:

- Modernise the NIWA Sensor Network through new IoT technologies and intelligent edge, rationalising our network locations and automating data life cycle management
- Develop an integrated NIWA Data Platform that improves data management and access and seamlessly enables data science/analytics to derive new insights from various integrated data sources
- Further develop performance compute workloads and define the long-term pathway for high-performance computing, including areas such as quantum modelling and machine learning
- Provide artificial intelligence and deep learning through integrating data science services into NIWA operations, research and applied science services and by communicating our data science story, successes and original IP

EMBRACING NEW TECHNOLOGIES

Adopting, developing and applying innovative technologies to ensure we deliver the information and products and services the nation needs

143
Technology & Innovation staff

20
AI and high performance scientific computing staff

$18M
High-Performance Computing Facility & Data Centre

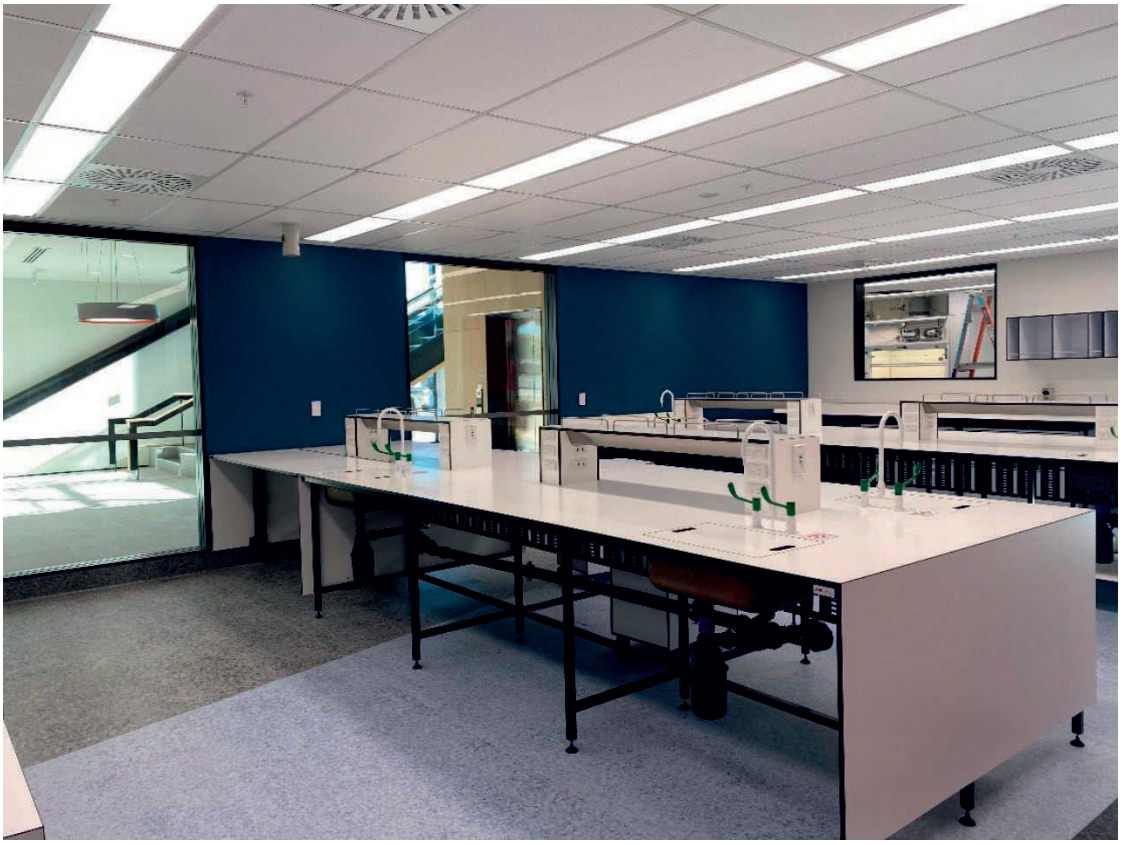
2,000+
climate stations providing representative coverage of New Zealand and the region (Antarctica, Pacific)

1,900+
hydrological stations for water management

1,000+
freshwater quality monitoring locations

- Two satellite-receiving stations with processing software and databases holding derived products used by science, forecasting and industry (e.g., fishing)
- Real-time sensor arrays deployed for various industries (e.g., irrigation, horticulture) to improve operations within environmental limits
- Investment in enabling technology and services to empower innovation: Industrial carbon-weave 3D printing machine, Autonomous boats and craft for survey, Mechatronics Laboratory, state-of-the-art studio for graphic and model representation
- Environmental databases – Marine, Biological, Geospatial, Image and Science
- Nationally significant databases and collections for Climate, Water Resources, Marine Invertebrates and Freshwater Fish
- Stable Isotope Analytical facility
- Droplet Digital PCR facility
- Commercial drone fleet with ground-penetrating radar, LiDAR, etc.
- High-precision National Weather Forecast Service used by DOC, FENZ and others
- National Flood Forecasting Service providing river flow forecasts for 60,000 catchments nationwide

- Improve information access and transparency through smart standardised contracts and data partnerships
- Reduce cyber security risk by continued investment and automation in cyber security as well as focused staff training



State-of-the-art laboratories occupy most of the ground floor in NIWA's new $45 million facilities on the Waikato University campus in Hamilton. The water quality lab here is awaiting final instrumentation fitout, but the template is designed to be easily adapted for the new premises required in Wellington and Christchurch. [Sarah Fraser]

4. Investing in Assets and Infrastructure

NIWA has a capital investment programme that ensures it has the assets and infrastructure required to deliver its future research and science services and support those critical for the Aotearoa New Zealand science system.

Future Property Programme

NIWA aims to invest in its properties to ensure they are contemporary and will meet the future needs of our workforce and science.

NIWA owns or leases facilities in 17 locations around New Zealand, chosen for proximity to the environments it studies and to its customers. Most of these facilities have now been upgraded to contemporary standards, and the Future Property Programme addresses the needs of NIWA's three most significant research centres – Hamilton, Wellington and Christchurch.

In planning this programme, NIWA has carefully considered and responded to changes in the way in which science is undertaken and applied, and also to the Te Ara Paerangi – Future Pathways White Paper. These 'new ways of working' are more flexible, collaborative and creative, while responding to the rapidly changing needs and expectations of a modern workforce. We also aim to provide opportunity for co-location with other science providers, partners and/or stakeholders with skills, expertise or needs relevant to NIWA's science domains.

Responses to such changing needs include a move away from traditional individual offices to open workspace environments, with laboratories consisting of adaptable, multi-use spaces, rather than being necessarily dedicated to single functions. This building programme is also an important contributor to NIWA's strategy for achieving its environmental sustainability goals and supporting the government's initiative to achieve a carbon neutral public sector by 2025.

The combined cost of the developments in Hamilton and Christchurch is estimated at $115 million. In addition, NIWA is projecting to contribute $100 million towards the redevelopment of its Greta Point site in Wellington, under the umbrella of the government's 'Wellington Science City' initiative involving the wider science sector. As discussed elsewhere in this SCI, these investments will be funded from NIWA's own resources and debt. It is hoped that construction of all three facilities will be completed by the end of 2027.

Science assets

In addition to investing in its large major research assets of national significance, NIWA will invest about $15 million annually to grow or refresh its other technologies, equipment and research assets to ensure they meet New Zealand's future science needs.

NIWA owns and operates core national infrastructure on behalf of the wider New Zealand science system. This includes three key assets: the deepwater research vessel *Tangaroa*, the National Environmental Monitoring Networks and the High- Performance Computing Facility. NIWA also maintains nationally significant databases and collections, including the National Climate Database, the New Zealand Freshwater Fish Database, the NIWA Marine Invertebrate Collection and the Water Resources Archive. NIWA has two additional key assets of international significance – the Northland Aquaculture Centre and the Lauder Atmospheric Research Station.

In addition to RV *Tangaroa*, NIWA operates a smaller ocean-going vessel, RV *Kaharoa*, a fleet of inshore coastal vessels, including *Ikatere* and *Rangitahi III*, and about thirty other small certified boats. NIWA maintains specific state-of-the-art specialist facilities that include a Stable Isotope Analytical Facility, satellite receiving stations at Lauder, Maupuia and Greta Point and equipment at the Arrival Heights Atmospheric Research Laboratory in Antarctica. In addition to the four main sites in Auckland, Hamilton, Wellington and Christchurch, NIWA also has 10 field offices across the country supporting our science.

To provide key major assets needed by NIWA and the wider science system, we will:

- Provide voyage time on RV *Tangaroa* to science providers, including voyages to Antarctica, and for fisheries stock assessments and the deployment of New Zealand's tsunami dart buoy network
- Complete the build and commissioning of the replacement vessel for RV *Kaharoa* by December 2023, and commence vessel operations in early 2024
- Continue to support the operation of the High-Performance Computing Facility and provide expertise to users, and contribute to initiatives that eventuate from the recommendations of the recent MBIE review 'Infrastructure and related services to support New Zealand's eResearch future'
- Develop a business case for the replacement of our current High-Performance Computing capability to ensure it meets NIWA's and the wider science sector needs for the next 6 years
- Upgrade and rationalise our measurement networks, including development of new environmental monitoring and sampling technologies, to ensure they meet end-user needs and support enhanced environmental modelling and forecasting systems
- Accelerate production of yellowtail kingfish to full capacity (600 tonnes) within the newly constructed experimental commercial-scale recirculating aquaculture system
- Replace the satellite receiving station at Lauder to enable ongoing access to environmental data from new and planned global satellite systems

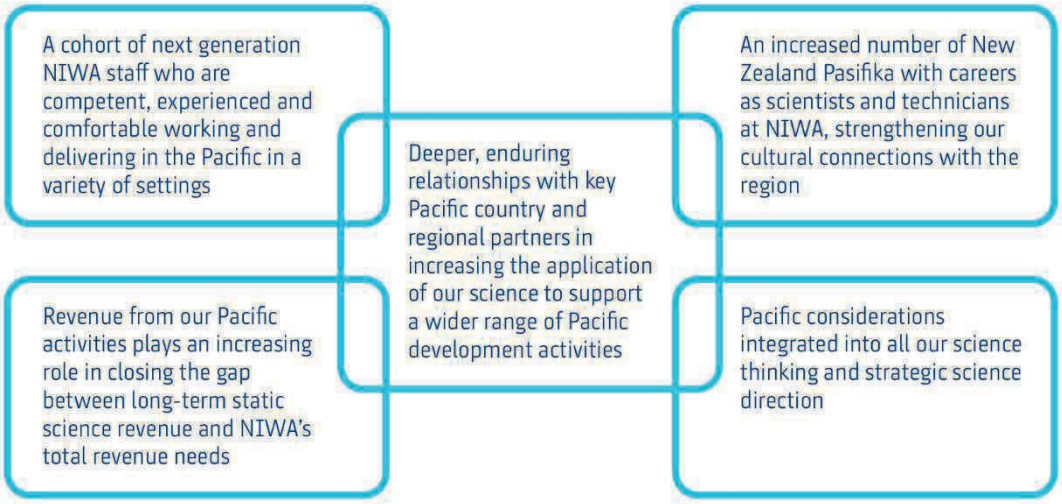
Architect's drawing of new facilities at Greta Point designed to accommodate staff from a variety of collaborative and integrated organisations co-located under the banner of the National Centre of Climate, Oceans and Hazards – one of three hubs envisaged as part of the Wellington Science City proposal.

5. Supporting Pacific resilience

NIWA aims to:

a) *Have deeper, enduring relationships with key Pacific countries and regional partners, increasing the application of our science to support a wider range of Pacific development activities*
b) *Grow the next generation of NIWA staff who are competent, experienced and comfortable working and delivering science in a variety of settings*
c) *Increase the number of Aotearoa New Zealand Pasifika with careers as scientists and technicians at NIWA, strengthening our cultural connections with the region.*

NIWA has long and enduring relationships with our Pacific and regional partners across a wide range of activities, including disaster risk reduction, early warning climate services and climate change adaptation, water security and sanitation, fisheries, marine invasive species management, ocean sciences and other marine resource management. NIWA's Pacific Strategy continues to have a primary focus of strengthening these multi-level relationships and partnerships with the key Pacific regional agencies and national ministries/departments that we collaborate with, and supporting New Zealand's Ministry of Foreign Affairs and Trade (MFAT) to effectively deliver development impacts in the region.



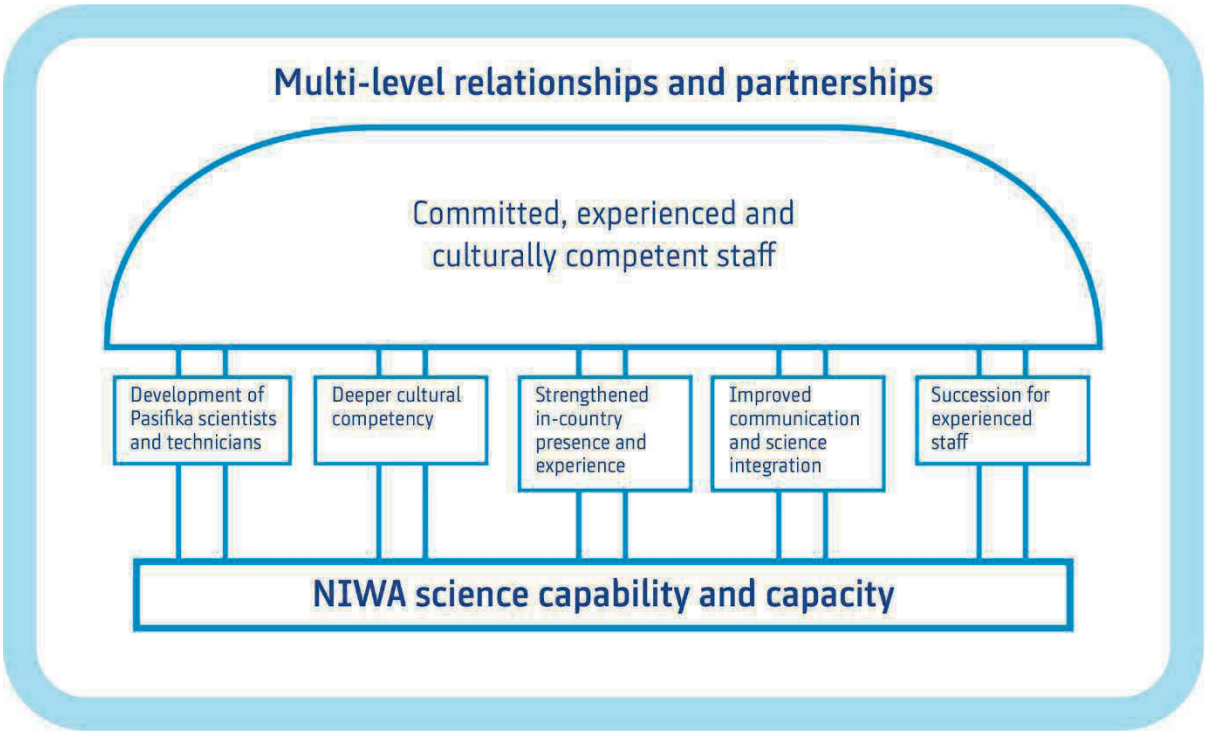
NIWA's Pacific Strategy goals.

NIWA's Pacific Rim Science Centre coordinates our engagement with the relevant agencies in New Zealand and the Pacific region, and has been in place for 13 years. We seek to maintain and build our long-term Pacific relationships, and work to understand local needs. Our ability to deliver projects in the Pacific region is highly dependent on a cohort of committed, experienced and culturally competent staff with the relevant technical and science skills to meet the needs and requirements of the region. We will continue to build relevant science capability and capacity.

Partnerships, scientific expertise and resources are central to our work across the countries of the Blue Pacific Continent – playing a fundamental role in contributing to, and advancing, New Zealand's Pacific resilience approach.

To meet the goals of developing our people, leveraging our science and relationships to support New Zealand's Pacific objectives, we will:

- Continue our strong strategic engagement and align our science capability and capacity to help MFAT deliver impact from its climate finance commitments across the nations of the Blue Pacific Continent
- Continue to build, maintain and strengthen our connections through collaboration with our Pacific and regional colleagues in support of sustainable development, resilience building and management of intergenerational impacts
- Increase our focus on opportunities to support ocean science within the region
- Meet our long-term commitment to provide technical support and continued development of the capability and capacity of our partners in the Pacific region
- Develop targeted partnerships and programmes to provide STEM pathways and opportunities for New Zealand-based Pasifika
- Continue to build internal cultural competency, and expand the depth and breadth of our relationships within the Pacific region



Samoan Fale model and key pillars of NIWA's Pacific strategy.

6. Communicating for maximum impact

NIWA aims to ensure that the knowledge our science develops is communicated to our stakeholders and society to inform policy and planning and guide business and societal decision making.

Excellent science is fundamental to the sustainable management of our natural resources and a society that prospers in a rapidly changing world. But science is often complex, and we must engage with our audience using a style and manner they can understand, readily access, and easily use.

NIWA's science has many different audiences, reflecting the areas we operate in, but all our audiences need to better understand the disruptive and complex world we live in – from central and local government agencies making management and policy decisions, to climate-sensitive businesses that need accurate forecasts, and the general public seeking to better understand the impacts of our changing world. Society has changed – people expect information and data to be immediately available and easily interpreted, and technology has altered the way information is delivered and received. Skilful communication reinforces our reputation as the provider of authoritative, independent, impartial and innovative science.

NIWA invests substantially in its communications team and their resources to meet this demanding scenario. This investment ensures a high profile, through more than 100 media releases annually, highly engaging videography and data visualisation, and a very active social media presence. NIWA's annual mainstream media audience is well over 100 million and our social media reach exceeds 13 million. We also engage with thousands of school and university students each year as the major sponsor of science and technology fairs nationwide, as the Principal Science Partner of BLAKE, and by supporting Sea Life Kelly Tarlton's Aquarium.

We have a fully equipped studio and staff capable of producing sophisticated and tailored data visualisation to communicate our science. Our output includes graphics and animations of weather modelling and observations for the presentation of tailored forecasts for clients and their websites, conveying long-term climate change projections or high-resolution environmental forecasts, visualising changes in air quality or forecasts of river flows, or presenting bathymetric data. *Seasonal Climate Outlooks* and *Pacific Island Climate Updates* are filmed in the studio, as are many of our live feeds for media engagement. Our studio is available for, and used by, other research organisations and stakeholders seeking to communicate their messages in new and engaging ways.

NIWA has an extensive, dynamic, and informative website that also functions as a showroom and library for hundreds of media releases and videos designed to tell our science stories in a simple, engaging style.

To meet its communications goals, we will:

- Present the organisation as the primary authority and source of information in climate, freshwater and marine science
- Lead public engagement and understanding of the critical issues in these areas of science
- Enhance knowledge transfer and stakeholder uptake through the continual development of dynamic, highly visual imagery and innovative technologies, tailored stakeholder communications and engagements and a thoroughly revised website
- Continue development of our communication and engagement with Māori to support greater uptake and use of the latest science and guidance for Māori authorities tasked with planning and development in their communities
- Continue to enhance understanding of the role and benefits of science and, in particular, foster an interest in science among students of all ages
- Enhance internal communications, particularly in recognition of, and response to, the rapidly changing and disruptive environment
- Communicate NIWA's environmental sustainability commitment, engagement and reporting

7. Valuing our people

NIWA's reputation as a successful CRI results from the calibre of our people and key elements of our culture, which jointly prioritise organisational performance and staff health, safety and wellbeing.

NIWA has adapted well to the changes and challenges that all organisations have faced in recent years. Our people have proven to be resilient and adaptable in continuing to achieve high standards of performance in support of the organisation's goals, in an ever-changing environment. New technologies for communication and connection that were introduced during the early COVID lockdown period are now extensively used and well-established. We have taken the new skills and experience generated by necessity during the COVID period and incorporated these into our daily practices.

The COVID pandemic years and other recent international and national events and influences have created an environment which is characterised by ongoing uncertainty, with the potential for anxiety to impact negatively on staff morale. A focus on staff wellbeing is inherent in NIWA's culture, with attention to both physical wellness and psychological components of wellbeing. NIWA has had a strong foundation for supporting staff wellbeing while maintaining a focus on productivity and performance, and this strength has been leveraged and enhanced in the last few years.

As an organisation of knowledge workers, operating across a nationally distributed range of workplaces and working environments, NIWA operates with a high trust, high delegation, high autonomy approach to managing our people. We have historically had a relatively high degree of workplace flexibility, and this flexible mode of working stood us in good stead over the pandemic lockdown period and subsequently. Like other organisations, however, the lockdown period reminded us of the significant value and importance of face-to-face interaction with work colleagues in the workplace. Since the lockdown period ended, we have maintained a focus on restoring the status of the NIWA workplace as the primary place of work, reinforcing our unified 'One NIWA' philosophy.

We continue to rely on the international labour market to source specialised scientific and technical skillsets, and this has been a challenge in recent years, with greater difficulty and longer timeframes for international recruitment. We have seen an increasingly competitive Aotearoa New Zealand labour market for in-demand science, information technology and other skillsets, with ongoing challenges to retention of critical capability. Upward pressure on remuneration levels continues, exacerbated more recently by cost-of-living increases. However, our reputation has meant we remain able to attract and retain high-calibre candidates, and we continue our efforts to provide a competitive package of remuneration and benefits relative to the New Zealand general market. The local and international labour markets and the broader economic situation require ongoing close attention to workforce planning for recruitment and retention.

NIWA's highly motivated and high-performing employees value being involved and informed about policies and decisions that affect their work. Constructive dialogue between senior management and the distributed NIWA workforce remains critical to maintaining a cohesive approach and positive relationships with our people, and this continues as a priority. There is growing energy and enthusiasm from our early career staff to have a greater voice in organisational affairs and initiatives, and enhancing their experience is a focus. We will review and refresh our Performance and Development system and processes, with a view to simplifying them for managers and team members where possible, and emphasising positive experiences that better achieve the underlying development purpose. We will also review and refresh NIWA's organisational values, through a consultative process across the organisation.

Enhancing diversity and inclusion has been an important focus in recent years, and we will continue to provide a highly flexible, diversity-aware, and family-friendly workplace – elements which are increasingly expected and valued by today's workforce. A joint NIWA/PSA working group examining gender and ethnic pay equity began work in 2022, and this programme will continue, implementing aspects of the government's Kia Toipoto programme.

There is a growing demand for the skills and services of NIWA's Te Kūwaha team of Māori environmental researchers and associated staff. Further developing NIWA's bicultural organisational capability with Te Kūwaha's guidance and support is an important organisational goal.

NIWA's three-year Senior Leadership Development Programme took in its third cohort of a dozen high-potential future leaders in 2023. The programme focuses on skills and mindset development, exposure to contemporary thinking and research on effective leadership and opportunities to apply these learnings to current challenges at NIWA. We also provide a range of other leadership-related learning and development opportunities for a wider group of NIWA staff, with a suite of in-house and externally provided workshops each year. Provision of these broader leadership development opportunities has benefitted from increasing use of virtual delivery of key modules in a seminar-based format.

We continue to develop staff and their professional competency, mentor early career staff and provide opportunities to upskill, network and create and enhance collaborative relationships via a range of initiatives. Recently we have further enhanced our successful Project Management framework, with refreshed training and additional guidance and tools available for our people to support effective and efficient project planning and delivery.

Health and safety is paramount at NIWA, and we promote excellence through improving safety leadership, personal decision making, and health, safety and wellbeing practices. With input from our people, our health and safety systems and tools are constantly reviewed and refined, with an emphasis on implementing simple, efficient, user-friendly procedures that are appropriate for the work we do.

To continue to maintain a positive, safe and fulfilling work environment, we will:

- Continue to achieve organisational performance targets for collaboration, knowledge transfer, the provision of high-quality information, the resources and products our next users need, and operational efficiency and on-time delivery
- Draw on the strengths of NIWA's culture to reinforce staff morale, resilience and cohesion
- Maintain a dual focus on staff wellbeing and performance, providing tools and resources to support and enhance both
- Review and adapt workforce planning, recruitment and retention strategies to address changing market conditions
- Continue to review and refine our employment terms and conditions to ensure we can successfully recruit and retain critical capability, and keep our staff updated on the value of their overall pay and benefits package
- Focus on positively influencing staff engagement by ensuring that senior managers are as visible, accessible and communicative with staff around the country as possible
- Work with our early career staff to ensure they have a voice in the organisation to achieve an enhanced experience and outcomes for this group
- Review and refresh NIWA's Performance and Development system and processes to simplify and improve them
- Revisit and update NIWA's organisational values through a consultative process across the organisation
- Maintain leadership development and succession activities to ensure we proactively grow current and future leaders
- Continue to work with the other Crown Research Institutes to identify and achieve synergies in how we manage our people and organisations, and to develop a more diverse science workforce
- Build science capacity and capability through inclusion and co-supervision of postgraduates within our science programmes and postdoctoral positions, facilitating science experts as visitors, and building on our collaborative relationships, all of which enhance staff development
- Embed new project management initiatives that align with and build on organisational performance, bicultural capability, information technology, and health, safety, wellbeing and sustainability frameworks, enabling a productive workforce
- Refine systems and processes to enhance health and safety performance and capability

8. Taking environmental responsibility

NIWA's ongoing aim is to conduct our activities with the lightest possible environmental footprint.

Environmental responsibility is one of the four pillars of our Organisational Sustainability Framework. We commit to Organisational Sustainability through:

- Investing in our people, technology and infrastructure
- Providing advice and services to end users and other stakeholders
- Partnering with iwi, local communities and the wider society
- Ensuring operations are as environmentally sustainable as practicable

NIWA is committed to environmental sustainability, with much of our research being focused on working with others to deliver solutions that impact on, influence, or contribute to the sustainable management of natural resources.

We aim to operate with the lowest possible environmental footprint and be an exemplar in environmental sustainability, and we are committed to continuous improvement. A key focus is on achieving carbon neutrality by 2025 – with the aim of minimising our energy, waste and water footprint and offsetting our remaining emissions. Sustainability initiatives continue to be successfully operationalised to reduce emissions at both national and site levels.

In 2022, we completed our baseline Toitū Envirocare audit, and we are now a certified 'carbon reduce' organisation. The Toitū 'carbon reduce' programme provides a platform to accurately collate and report on greenhouse gas emissions and identify targets and projects to reduce emissions. Our comprehensive baseline emissions inventory for the 2018–19 financial year – a pre-COVID year – more accurately details our business-as-usual activities. This year we are preparing inventories for intervening years to enable us to better monitor and manage our carbon emissions. Our carbon inventory and management plan includes emission reduction activities and targets for our gross emissions, including an overall 5% reduction in category 1 and 2 emissions, a 10% reduction in emissions relating to air travel and a 5% reduction in vehicle fuel emissions.

We are committed to reducing our carbon footprint, focused on embedding our reduction activities in our usual activities, and ensuring we are innovative in building lower emissions into planning and delivering our excellent science. We will continue to achieve this by:

- Measuring, reducing and reporting our footprint, with independent verification (Toitū)
- Our Green Star 5 Future Property Programme that integrates energy saving design and operational efficiency
- The purchase of electricity from hydroelectric or renewable energy providers and reducing electricity and water use through improved infrastructure maintenance
- Working with service providers, including freight and waste removal, to improve accuracy of reporting and identify reduction activities
- Survey our staff to better understand commuting behaviours and explore ways to support reducing this part of our carbon footprint
- Continue our vehicle fleet replacement strategy that aims for the lowest emitting in class and hybrid and electric vehicles, while maintaining a fit-for-purpose fleet
- Continue the inclusion of low-emission propulsion technologies, an efficient hull shape in the build of the replacement vessel for RV *Kaharoa* and the ability to use alternative fuels or propulsion in our smaller boat fleet
- Striving to constrain air travel, while maintaining connectivity through our investment in digital communication technologies
- Investing in science that supports a just transition to low carbon, sustainable use of renewable resources and the mitigation of greenhouse gas emissions

9. A financial approach that enables delivery

As a Crown Research Institute, one of NIWA's fundamental operating principles, set out in its Statement of Core Purpose, is that it must run in a financially sustainable manner. This means that, in addition to securing enough revenue to fund day-to-day expenses, it must generate sufficient cash flow to ensure that it can continually invest in maintaining and upgrading the assets required to support its science mission for the long term.

This focus on maintaining and upgrading key science assets is especially critical for NIWA because its areas of science expertise require state-of-the-art scientific equipment as well as several large assets, such as its High-Performance Computing Facility, its marine research vessels and its office and laboratory buildings. Ensuring that NIWA is in a position to deliver on this requirement requires careful planning. These plans must be continually reviewed in the light of changing circumstances, and modified as required to ensure that NIWA's financial sustainability is protected for the long term and NIWA can continue to deliver on its science mission on behalf of the nation.

NIWA maintains a Long-Term Financial Plan with a ten-year horizon. The revenue and cost assumptions in this plan reflect a prudent view of NIWA's financial outlook, consistent with those reflected in this Statement of Corporate Intent for the coming five years. The plan identifies NIWA's anticipated investment needs over the next ten years, and the operating and financing cash flows necessary to fund them.

Underpinning NIWA's approach to financial planning is the way it manages its operations to deliver financial performance in the short term and financial sustainability in the long term. This involves a close focus on delivering the margins necessary to ensure the delivery of sufficient operating cash flows to support its long-term investment plan. NIWA achieves this through a rigorous approach to project management, with all its science activities, whether research or applied science, being managed through its project management and accounting system. This enables all NIWA's research and applied science work to be closely managed to ensure completion within budget, and thereby the delivery of the margin objectives.

The Finance, Procurement and Legal function supports and enhances NIWA's organisational health and financial sustainability by delivering the following four outcomes:

- Effective processes which 'just happen'
- Insight to guide decision making
- A source of trusted professional advice
- Properties fit for world-class science

The Finance, Procurement and Legal function has the following key objectives:

- Financial accounting and external reporting will be delivered on time, free from material error and as efficiently as possible
- Financial and administrative operations will be effective, efficient and well controlled, while allowing seamless interaction with customers, suppliers and staff
- Management reporting and financial analysis will be insightful, intuitive and well positioned to support agile decision making at all levels of the organisation
- Risk management activities will help all areas of the business prosper by ensuring that risks are managed to an acceptable level while facilitating an agile and responsive operating environment
- Property upgrades will be consistent with an overarching property strategy that ensures that all NIWA's properties are of a contemporary standard and closely align with its future needs
- Internal audit activities will identify opportunities to improve systems and processes while providing assurance to the Executive and Board that risks are being appropriately managed

Financials

The financial assumptions reflected within this SCI reflect a return to a more normal operating environment following recovery from the impacts of COVID-19. Despite these impacts, NIWA has continued to focus its attention on long-term strategic planning and seeking out opportunities with a focus on continued growth. This SCI provides for the capital investment programmes required to deliver the major facility and equipment upgrades and replacements discussed elsewhere in this document, together with continuing investment in the scientific and other equipment and infrastructure required to ensure NIWA retains its place at the forefront of environmental science.

In developing our financial projections, we have assumed only marginal changes to NIWA's current operating environment, beyond the immediate recovery from the impacts of the pandemic. In particular, we have taken a prudent approach to assumptions around increases in government research funding as well as commercial charter voyages for RV *Tangaroa*.

The three years of our financial plan set out in this SCI reflect an expectation of continued growth in both research funding and revenue from the delivery of applied science services, with operating costs continuing to be tightly controlled. The budgeted Group revenue for 2023/24 is $199.7M, with total costs of $189.2M, delivering an operating surplus before tax (EBIT) of $10.5M and an adjusted return on equity of 3.5%. NIWA expects to continue to deliver strong operating cash flows, with a budgeted EBITDAF of $32.2M in 2023/24.

Revenue

In 2023/24 NIWA Group revenue is budgeted at $199.7M, up by $10.4M compared with the forecast for the 2022/23 year and by $11.1M compared with the level contemplated by last year's SCI. The increase on the prior year forecast is mainly due to anticipated growth in commercial applied science revenue, and revenue related to the new 600 tonne experimental Recirculating Aquaculture System (RAS).

In 2024/25 we are projecting a further increase in revenue to $206.2M, mainly due to the increased production from the RAS alongside further growth in commercial applied science revenue. Research funding has not increased in line with inflation in recent years, which is putting pressure on NIWA's ability to conduct fundamental research aligned with the goals of the nation. This is partially mitigated by projected increases in applied science revenue throughout the period as we continue to collaborate with other science organisations and the sectors that apply our science products and services. Nonetheless, continued real-term erosion in Strategic Science Investment Fund (SSIF) funding will inevitably lead to erosion in NIWA's capability over time, if not addressed.

Operating expenditure

In 2023/24, operating expenses are budgeted at $189.2M, up from $179.5M forecast for 2022/23. The increase in costs is mainly attributable to higher direct costs (associated with the projected increase in revenue), the effects of inflationary pressures and the escalation of staff costs.

Beyond 2023/24, while recent operating cost efficiency gains are expected to be maintained, we have assumed a higher level of inflation than we had previously projected. In 2024/25, we have provided for increases in operating expenses associated with the increased production from the RAS.

Balance sheet management

NIWA's science is capital intensive and requires an ongoing investment in scientific equipment if we are to deliver excellent science, secure revenue and be financially sustainable. In order to protect NIWA's ability to deliver the science that the nation needs for the long term, we plan to continue to make provision for these essential investments.

Alongside the underlying requirement to continue to renew its science equipment and infrastructure, NIWA plans to make significant strategic investments in renewing many of its properties and facilities. The forecast set out in this SCI contemplates a requirement to spend in the region of $115M (including funds already spent) on

replacing the physical infrastructure and buildings at two of NIWA's major regional centres in Hamilton and Christchurch. The Company's financial plan also reflects a contribution of $100M towards the redevelopment of NIWA's Greta Point site in Wellington, under the umbrella of the government's 'Wellington Science City' proposal involving the wider science sector. NIWA will fund these investments from a combination of its existing resources, operating cash flows and debt facilities.

As noted elsewhere in this document, NIWA is well advanced with a project to replace the ageing RV *Kaharoa*. An investment requirement of $33M (including funds already spent) is provided for during the SCI period to fund this.

Finally, provision is made in 2024/25 for up to $9M of investment to update or replace NIWA's High-Performance Computer Facilities.

Cash flow

NIWA expects its operating cash flow to remain steady, with an EBITDAF margin in a range of 16–18% throughout the SCI period, and EBITDAF in a range of $32–37M. In 2023/24, NIWA expects to require debt financing to support its strategic capital investment needs. This is projected at $34M in 2023/24, rising to a peak of $104M in 2026/27, and is expected to be repaid over the following six to seven years. This financing requirement continues to represent an estimate at this point and will evolve as the certainty of both the costs of NIWA's strategic capital spending needs, and of profitability in the SCI out-years and beyond, increases over time.

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 continue to review this on an annual basis.

Return on equity

NIWA's budgeted adjusted return on equity in 2023/24 is 3.5%, down from a forecast 4.0% in the prior year. This metric is expected to decline over the years that follow due to interest expense associated with the debt financing requirement discussed earlier. (The higher level in 2025/26 is due to anticipated gains on the disposal of property.)

Risks

NIWA's approach to financial management is guided by the statutory requirement that it must run in a financially sustainable manner. This means that it can continue to generate the cash flow that it needs to fund its ongoing operations as well as being able to invest in the new and replacement capital assets that it needs to deliver on its science mission on behalf of the nation for the foreseeable future.

Managing the financial risks that the organisation faces is a key element of this approach to financial management. In general terms, NIWA's approach to managing financial risks is to identify them early through continuous monitoring of financial and operational performance, and then to quickly respond to any such emerging risks consistent with the overarching objective of maintaining the Company's financial sustainability. Where necessary, this includes a willingness to take difficult decisions to realign capacity and cost to respond to emerging risks to revenue.

The rest of this section addresses the most significant risks that NIWA currently sees as having the potential to impact on its financial sustainability.

Revenue risk

There is some forecasting uncertainty associated with NIWA's revenue expectations. The revenue assumptions built into the SCI forecast reflect an expectation that applied science revenue will increase to meet the growing demands for science services within NIWA's key areas of expertise. The assumptions also reflect an expectation that NIWA will continue to be successful in growing its share of contestable revenue contracts. If these expectations are not realised to the extent forecast, then profitability will be adversely impacted in the short

term. In this event, and consistent with the overall approach to financial risk management discussed above, NIWA would need to adjust its cost structure to restore its financial sustainability.

The Company's ability to recruit and retain staff remains as one of the most significant revenue risks that NIWA faces. If it does not have sufficient staff with the required levels of skills and experience, the organisation will be unable to deliver the outputs needed to derive the revenues reflected in its financial plan. Immigration settings remain one of the most significant challenges in this area given the international nature of NIWA's science.

We note that a key challenge facing NIWA in the coming several years is the assumption reflected in this SCI that the SSIF that underpins NIWA's research capability will remain at current levels for the SCI period. This continues a lengthy period during which the real value of this funding has eroded. NIWA's response to this challenge has been to reduce and refocus the work that it undertakes that is funded through SSIF. This approach will continue for as long as this situation continues.

Uncertainty also exists around revenues from commercial charters of NIWA's vessel RV *Tangaroa*. While the SCI reflects a relatively conservative realistic assessment of available commercial charter days, the maintenance and operation of this important science capability for the nation does remain reliant on NIWA winning such commercial contracts. If the market for this charter work significantly deteriorates, then NIWA's profitability will be adversely impacted.

Cost risk
Over the past two years risks associated with cost pressures have grown in significance to NIWA. The most significant of these risks concerns salary costs, which have seen significant growth in the wider market that NIWA has not always been able to match. NIWA manages this risk by constantly monitoring the market to identify areas where the Company's remuneration may be becoming uncompetitive and responding where it is able to do so. Where necessary, NIWA must implement pricing responses itself to maintain the organisation's ongoing financial sustainability.

Other risks
There are both liquidity and interest rate risks associated with the financing of NIWA's extensive capital investment plans. Liquidity risk will be managed through continued close management of the Company's operating performance. If necessary, this will include taking early action to adjust the organisation's cost base if revenue is not delivered in line with the plan. Options to manage interest rate risk will be explored, including by establishing fixed rate debt facilities prior to entering into contractual commitments to undertake future debt-funded major capital investments.

Overall, we consider NIWA's financial planning to be realistic, and are of the view that there is broadly equal downside risk and upside opportunity. We are confident that NIWA's 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 ($M)	Forecast 22/23	SCI 23/24	SCI 24/25	SCI 25/26
Revenue	189.28	199.71	206.23	209.13
Revenue growth	11.2%	5.5%	3.3%	1.4%
Operating results				
Operating expenses & depreciation	179.48	189.18	193.89	194.62
EBITDAF	30.00	32.23	37.06	36.77
EBIT & dividend received	9.80	10.53	12.34	14.51
Profit before income tax	8.85	8.45	8.24	8.91
Profit after tax	5.31	4.85	4.87	17.10
EBITDAF per FTE	0.043	0.045	0.052	0.051
Average total assets	234.44	256.60	289.27	318.66
Average equity (Shareholders' funds)	157.17	162.28	167.14	178.13
Adjusted average total assets*	207.21	229.37	262.03	291.42
Adjusted average equity*	134.31	139.42	144.28	155.27
Capital expenditure (incl. Capital committed)	58.39	66.62	45.77	61.00
Capital expenditure % to revenue	30.8%	33.4%	22.2%	29.2%
Liquidity				
Current ratio	56.0%	58.2%	61.7%	60.4%
Quick ratio (aka Acid test)	1.08	0.75	0.85	0.80
Profitability				
Adjusted return on equity*	4.0%	3.5%	3.4%	11.0%
Return on equity	3.4%	3.0%	2.9%	9.6%
Return on assets	4.2%	4.1%	4.3%	4.6%
EBITDAF margin (aka Operating profit margin)	15.8%	16.1%	18.0%	17.6%
Operational risk				
Profit volatility	20.4%	18.9%	18.6%	11.9%
Forecasting risk (non-adjusted ROE)	2.9%	2.6%		
Coverage				
Interest cover	9.4	5.0	3.0	2.59
Growth/Investment				
Capital renewal	317.9%	349.4%	207.3%	310.6%
Funds available for distribution ($M)	0.0	0.0	0.0	0.0
Financial strength				
Gearing	2.3%	17.1%	24.7%	28.5%
Equity ratio (aka Proprietorship)	67.0%	63.2%	57.8%	55.9%
Cash and short-term deposits	0.50	0.50	0.50	0.50
Financial debt	3.74	33.90	55.51	74.46

*Statement of Corporate Intent indicators.

Performance targets 2023/24

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 2022/23	Target 2023/24
Operating margin	Earnings Before Interest, Tax, Depreciation, Amortisation and Fair-value (EBITDAF)/Revenue	Annually	15.8%	**16.1%**
Profit per FTE	EBITDAF/FTEs	Annually	$43,000	**$45,000**
Quick ratio	Current assets less inventory less prepayments/Current liabilities less revenue received in advance	Quarterly	1.08	**0.75**
Interest coverage	EBITDAF/Interest paid	Quarterly	9.4	**5.0**
Profit volatility	Standard deviation of EBITDAF for the past five years/Average EBITDAF for the past five years	Annually	20.4%	**18.9%**
Forecasting risk	Five-year average of return on equity less forecast return on equity	Annually	2.9%	**2.6%**
Adjusted return on equity	NPAT excluding fair value movements (net of tax)/Average of share capital plus retained earnings	Quarterly	4.0%	**3.5%**
Revenue growth	% change in revenue	Annually	11.2%	**5.5%**
Capital renewal	Capital expenditure/Depreciation expense plus amortisation expense	Quarterly	317.9%	**349.4%**

Organisational performance indicators – 2023/24 at a glance

Measure	Calculation	Reporting frequency	Target 2022/23	Forecast 2022/23	Target 2023/24
End-user collaboration*	Revenue per FTE from commercial sources	Quarterly	$108,000	$117,000	**$138,000**
Research collaboration*	Publications with collaborators	Quarterly	85%	93%	**85%**
Technology & knowledge uptake*	Commercial reports per scientist FTE	Quarterly	1.0	1.3	**1.0**
Science quality*	Impact of scientific publications	Annually	2.5	2.5	**2.5**
Operational efficiency*	Revenue per FTE	Quarterly	$247,000	$243,000	**$261,000**
Operational delivery	% projects delivered on time	Annually	>90%	>90%	**>90%**
Strategic progress	% annual KPIs achieved	Annually	>90%	>90%	**>90%**

**Ministry of Business, Innovation & Employment generic indicators.*

Key performance indicators 2023/24

Science KPIs

1. Tailored information, guidance and engagement tools on the management of natural hazards and climate change risks are produced to support iwi, hapū/Māori business, stakeholder and community resilience planning and decision making.
2. Coastal and river flood-plain climate change hazard and risk exposure is further quantified for use in risk assessments and financial disclosures.
3. Remotely sensed and direct environmental observations from Cyclone Gabrielle-response surveys ascertain changes to seabed geomorphology, cyclone-related sedimentation, the water column and benthic habitats.
4. Updated regional climate change projections consistent with IPCC AR6 are being developed for New Zealand, the Southwest Pacific region and the Southern Ocean to inform mitigation policy and adaptation options.
5. The effects of climate change on taonga species are better understood through our Toitu Nga Taonga Wai Māori project partnerships.
6. A framework that accounts for climate change is developed to prioritise marine restoration and rehabilitation activities.
7. Greenhouse gas measurements from surface stations and satellites are combined with modelling to estimate regional to national scale greenhouse gas emissions and uptake by the terrestrial biosphere.
8. A template for a curated library of molecular sequence data of New Zealand marine species is developed for the application of environmental DNA to biodiversity surveys.
9. The Freshwater Biosecurity Exchange is established as a brokerage for scientific research, tool development and as an advisory for public agencies responsible for biosecurity management and policy development.
10. Better measuring and monitoring of key marine habitats is enabled by improving high spatial-resolution satellite data for the New Zealand region by calibrating remote data against in situ knowledge using novel multiscale methods.
11. Guidance is prepared and disseminated for developing water allocation rules that cover high-flow harvesting as well as run-of-river takes, for inclusion in regional plans.
12. Wastewater treatment wetland design and costings are developed that provide timely and accurate designs for three types of constructed wetland types and three effluent disposal options.
13. Scientific surveys and assessment of the current status of selected fish stocks, and impacts of selected fisheries on bycatch species and habitats, are completed and inform national and international management.
14. Premium yellowtail kingfish is produced in a commercial scale, environmentally controlled, land-based recirculating aquaculture system at NIWA's Northland Aquaculture Centre, with continuous improvement across the production chain.
15. Access to more than 50 NIWA datasets is provided through the pan-CRI National Environmental Data Centre.
16. NIWA's national climate and freshwater data archives store sensor data from over 10,000 monitoring stations.
17. NIWA is represented in at least eight key regional meetings annually in the Pacific-Asia region to develop networks, identify assistance opportunities and facilitate implementation of work programmes, and advance New Zealand's international reputation.

Organisational KPIs

1. Organisational performance targets are achieved for collaboration, knowledge transfer, the provision of high-quality information, resources and products our next users need, with appropriate pricing, operational efficiency and on-time delivery.
2. Create opportunities for two Māori science graduates to advance into postgraduate and/or research career pathways via NIWA's Te Piko o te Māhuri programme.
3. Develop a Te Tiriti roadmap for NIWA, including the rollout of Te Tiriti o Waitangi training across the organisation.
4. Implement a clear direction and guidance that expresses NIWA's commitment to Māori Data Sovereignty and WAI262.
5. Knowledge transfer, stakeholder uptake and community engagement and awareness has been enhanced through more than 100 media releases, science videos and engagement activities by 2024.
6. Community appreciation of the role and benefits of science, particularly by students of all ages, has been enhanced through sponsorship of at least 12 science and technology fairs nationally.
7. Construction and commissioning of a new coastal research vessel to replace RV *Kaharoa* has been completed by 2024.
8. The new Hamilton premises have been completed and occupied by staff in early FY2023/24.
9. Subject to Ministers' approval of the Implementation Business Case, the main construction tender for the development of NIWA's all-new facility in Christchurch has been awarded, and construction is underway in FY2023/24.
10. NIWA's Performance and Development Review process has been simplified and the user experience improved by 2024.
11. NIWA's organisational values have been reviewed and refreshed via a consultative organisational process by 2024.
12. A business case outlining the investment for the next generation of the NIWA High-Performance Computing Facility has been completed. If approved, an RFP to select vendors and hosts has also been completed.
13. A business case outlining the investment for a new NIWA Data Platform has been completed.
14. A programme to provide science and technician career pathways and opportunities for New Zealand-based Pasifika graduates is developed and operational.
15. A programme to build cultural and Pacific competency is developed and delivered to staff.
16. Partner with Māori and promote opportunities to advance their interests in the seafood sector, including land-based aquaculture.
17. NIWA is represented in 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.
18. Emissions inventories from 2019–20 to 2022–23 are completed, verified and published by June 2024.
19. A new NIWA Sustainability Officer is in place, leading strategic planning to support NIWA's environmental sustainability goals.
20. The experimental commercial-scale recirculating aquaculture system will progress to annual production of 600 tonnes of high-value kingfish at the Northland Aquaculture Centre testing the financial, operational, and biological feasibility by 2024.
21. Science capacity and capability has been built through inclusion and co-supervision of postgraduates within our science programmes and postdoctoral positions, facilitating science experts as visitors and our collaborative relationships, all which enhance staff development into the future.
22. New project management initiatives are embedded that align with and build on organisational performance, bicultural capability, information technology, health, safety and wellbeing and sustainability frameworks, enabling a productive workforce.

Statement of Core Purpose

NIWA's purpose is to enhance the economic value and sustainable management of Aotearoa 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 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.

NIWA's 36-metre marine research vessel takes shape (inset: computer-generated image of the final design). The vessel is on schedule for completion in December 2023, and the delivery voyage back to New Zealand will include the deployment of a suite of Argo floats across both the Atlantic and Pacific Oceans – continuing the tradition established by the NIWA vessel it is replacing – *Kaharoa*, which has deployed more than one-quarter of all the Argo floats in the world's oceans, an unequalled contribution to this globally critical source of oceanographic data. Specific attention has been paid to the environmental performance of the new vessel, including the design of the hull to minimise drag.
[Greg Foothead]

Organisational sustainability framework

NIWA incorporates organisational responsibility into its business on an ongoing basis, consistent with the principles and actions set out in its Sustainability Framework below. The Framework sets out NIWA's intent and aspirations for minimising its impact on the environment and contributing positively to social, economic, cultural and environmental sustainability. The Framework embraces both the United Nations Sustainable Development Goals and the New Zealand Treasury Living Standards Framework.
[UN Sustainable Development Goals (numbered icons) are aligned with implementation strategies throughout this SCI.]

The Sustainability Framework is operationalised through a companion set of operating policies and principles which are used as a guide to our decision making, including sustainability themes, actions, and SMART objectives that will help NIWA achieve its key business goals.

Other matters required by the CRI Act 1992

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
- External Reporting Board (XRB) with regards to Generally Accepted Accounting Practice (GAAP).

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

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

Policy and Procedure Statements

NIWA Group consists of:

- National Institute of Water and Atmospheric Research Ltd
- NIWA Vessel Management Ltd
- NIWA Natural Solutions 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.

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 NIWA's Annual Reports available at www.niwa.co.nz.

Dividend Policy

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

In considering this objective, the Board each year determines the level of surplus funds by reference to NIWA's:

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

Any dividend would be paid within two months of the financial year-end.

Shareholder Consent for Significant Transactions

The Board will obtain prior written consent from the shareholding Ministers 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.

Ratio of Shareholders' Funds to Total Assets

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

	2023 Forecast	2024 Plan	2025 Plan	2026 Plan
%	67.0	63.2	57.8	55.9

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

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

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

Commercial Value of the Shareholders' Investment

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

The NIWA Board is satisfied that the net asset position (or shareholders' funds) as at 30 June 2022 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 2022 was $154.480M.

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 2020/21 Statement of Corporate Intent. In the longer-term NIWA will be reviewing deep sea marine capability and future high-performance computing capability and how investment in these national science infrastructure assets may be supported.

Other Matters Specifically Requested by the Shareholder

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

Barry Harris, Chairman

Nick Main, Director

Directory

Board of Directors

- Barry Harris (Chairman)
- Nick Main (Deputy Chairman) (until 31 May 2023)
- Dr Tracey Batten
- Livia Esterhazy (appointed 1 June 2023)
- Janice Fredric
- Professor Margaret Hyland
- Mary-Anne Macleod
- Dean Moana

Executive Team

- John Morgan (Chief Executive Officer)
- Dr Rob Murdoch (Deputy Chief Executive, General Manager Science)
- Geoff Baird (General Manager Communications & Marketing)
- Patrick Baker (Chief Financial Officer)
- Warrick Johnston (General Manager Technology & Innovation)
- Dr Mary-Anne Dehar (General Manager People & Capability)
- Dr Helen Neil (General Manager Operations)
- Marino Tahi (General Manager Māori Strategy and Partnerships)
- Dr Alex Thompson (General Manager Research & Strategy)

Solicitors

Meredith Connell
Atkins Holm Majurey Ltd

Auditors

Troy Florence with the assistance of PricewaterhouseCoopers on behalf of the Auditor-General

Bankers

ANZ Bank New Zealand 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

http://www.niwa.co.nz
https://www.facebook.com/nzniwa
https://twitter.com/niwa_nz

Science working for New Zealand

The Crown Research Institutes (CRIs) proudly work, individually and collectively, to create a more prosperous, sustainable and innovative New Zealand

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He Pūtaiao, He Tāngata

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TE PŪ AO

Manaaki Whenua
Landcare Research

NIWA
Taihoro Nukurangi

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NIWA
Taihoro Nukurangi

Climate, Freshwater & Marine Science