



LANDCARE
RESEARCH
MANAAKI
WHENUA

STATEMENT OF CORPORATE INTENT

2017-22



Contents

Our National Outcomes and Impacts.....	2
Chair and Chief Executive’s Overview	3
Our Strategic Focus	6
Māori Relationships and Vision Mātauranga	10
Landcare Research’s Core Purpose	11
National Outcome 1: Reversing the Decline of New Zealand’s Biodiversity.....	14
National Outcome 2: Sustainable Land Management	17
National Outcome 3: Reducing Greenhouse Gases	20
National Outcome 4: Development within Limits.....	22
Pathways to Impact.....	25
Infrastructure	26
Enviro-Mark Solutions.....	28
Capability and Culture.....	29
Science Excellence.....	30
Performance Monitoring and Reporting.....	31
Financial Performance.....	33
Appendices.....	35
Directory.....	40
Guide to Acronyms and Abbreviations	41

Statement of Corporate Intent 2017–2022

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Landcare Research

Driving innovation in New Zealand's management of terrestrial biodiversity and land resources to protect and enhance the land environment and grow New Zealand's prosperity

**SSIF Platform One:
Land-based Ecosystems**
Sustainably managing
terrestrial species, habitats
and ecosystems

SSIF Platform Two: Enhancing Land Use
Measuring and managing land resources,
and mitigating greenhouse gases and other
environmental impacts of land use

Outcomes of National Importance

Outcome 1:
Reversing the decline
of NZ's biodiversity

Outcome 4:
Development
within limits

Outcome 2:
Sustainable land
management

Outcome 3:
Reducing
greenhouse
gases

Our Partners that Deliver National Outcomes

Government

Māori

Primary sector

Science sector

NZ public

Impact Areas

Save treasured species

Look after the land

Reduce carbon emissions

Control high-priority pests

Support Māori aspirations

Verify environmental performance

SSIF infrastructure:
Nationally Significant Databases and Collections

Our sustainability

Our people

Our infrastructure

Chair and Chief Executive's Overview

We are pleased to present Landcare Research's Statement of Corporate Intent (SCI) for the period 2017–22. This sets out how we will achieve our purpose – 'science for our land and our future' – and in doing so meet our shareholders' and customers' expectations. Landcare Research's expertise is aligned strongly with the needs of the public sector. Increasingly we are using that expertise to add value to organisations in the primary sector and to support Māori economic development.

This SCI covers a new five-year strategic planning period for Landcare Research. In setting development priorities we have consulted widely with our external stakeholders, our Board's advisory panels and our staff. The next five years will see Landcare Research engaging closely with both its clients and the New Zealand public, seeking more strategic partnerships to deliver impact from our science, and continuing to build a high-performance culture.

Development in the period 2017–22 will build on a remarkable series of successes during the previous three years for science funding proposals led by Landcare Research across numerous contestable pools and involving many of our partners. This is a strong foundation on which to further enhance our science excellence and relevance, recruit and develop talent in areas of demand, and work closely with our clients to maximise the benefit of our work for New Zealand.

Contributing to government priorities

Landcare Research aligns its work closely with the [Business Growth Agenda](#). In particular, we will enhance our ability to support the Natural Resources and Innovation goals, which include goals for freshwater, biodiversity and biosecurity, and also for data infrastructure and accessibility.

Our contribution to meeting New Zealand's goals for freshwater (both allocation and quality) includes many areas of our science: supporting the design and implementation of ecological limits; the enhancement of collaborative governance mechanisms for natural resources; engaging Māori and their perspectives on water; and understanding soils and land use, and how they can be managed for freshwater outcomes.

Our approach to freshwater goals is a strategic and integrative one, bringing together disciplines and stakeholders at a national scale. This approach will also be adopted in relation to biodiversity and biosecurity goals. As host of the [New Zealand Biological Heritage National Science Challenge](#) we support an approach that integrates across a wide range of stakeholders, from catchment to national scale.

For Landcare Research to help meet [Predator-free 2050](#) and [Biosecurity 2025](#) goals, innovation in new and challenging areas of science will be needed. We will actively foster cutting-edge science and support it with a culture that celebrates new approaches and adaptiveness. We believe this is critical to a vibrant science organisation that can maximise opportunities in today's fast-developing technology environment. Examples include the development of regional predator-free initiatives that work effectively across protected, production and urban landscapes. Over the period 2017–22 we anticipate that most regions will be undertaking such initiatives, and we will assist through innovation in new predator-control technologies and the integration of an increasing range of tools and techniques at scale.

Regional development is another context in which we will increasingly contribute integrated science and innovation. Examples include support for regional product developments such as native honeys; and economic and environmental benefits from achieving a better understanding of local soils, risks (e.g. erosion) and land-use capability. We will continue our support for emerging Regional Research Institutes.

We seek to be the preferred partner of Māori, bringing science alongside mātauranga Māori to support Māori in meeting their development aspirations. Initiatives in the period 2017–22 will include planning with Māori stakeholders for the future of Te Awa Tupua (Whanganui); national

developments with mānuka; and pathways to ensure the protection and restoration of wairua in land and water. There has been significant growth in our Māori science capacity in recent years, and we have created a Tier 2 role for Māori development. Our goal is that all of our staff are able to contribute confidently and usefully in projects with Māori.

We will continue to support a large number of New Zealand (and also UK-based) companies in making credible claims about their environmental performance, especially their progress towards a low-carbon economy through reducing greenhouse gas emissions. Our subsidiary, [Enviro-Mark Solutions Ltd](#), will offer a set of solutions that meet companies' evolving needs in this area as more companies report nationally and internationally; for example, through the CDP (formally the Carbon Disclosure Project) and integrated reporting.

Our need for new skill sets reflects New Zealand's evolving business sector needs. As the primary sector moves towards more information-intensive systems, we will be training more scientists and technicians in these fields. As Māori look more to science for opportunities, we will be training more Māori scientists. As the natural resources sector in central and local government increases its need for more staff skilled in ecological limit-setting and public engagement in governance, we will be training more scientists in these fields. We expect to continue to co-supervise around 80 postgraduates each year.

Partnership focus

The period 2017–22 will see the National Science Challenges (NSCs) complete their 'first tranche' activities and demonstrate the value of greater partnership for higher-risk, higher-reward outcomes. We will continue our strong support of the Biological Heritage NSC, which we host, and will also work in close and strategic partnership with related entities, including Predator-Free 2050 and the new SSIF Genomics Platform. Alignment of these complementary initiatives will greatly facilitate delivery of the nation's goals.

Partnership for international opportunities is also a feature of our 2017–22 strategic plan. The Lincoln Hub Precinct, Te Puna Karikari, will continue to create opportunities beyond what could be achieved by the five Hub partners alone. We will be seeking foreign investment in science and innovation, where the Hub can be the 'shop-front' for New Zealand science's unique strengths in science quality, diversity, cost-efficacy and geographical context. Economic and environmental benefits to New Zealand will be much more significant than the revenue for the partners, either individually or collectively.

We will continue to develop partnerships with agencies leading science in areas relevant to our scope; notably predator control, soils and land, carbon, biodiscovery, and spatial informatics (sensing and visualising data). Antarctic science will continue as a major priority as we build our partnership with Antarctica New Zealand and support its role in international Antarctic science policy. We will align closely with the proposed Antarctica SSIF platform.

Performance focus

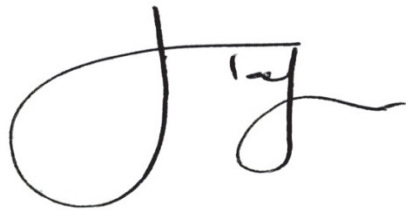
A major goal for 2017–22 is achieving and sustaining a high-performance culture in Landcare Research. Culture and performance are dependent upon people, and therefore our people strategy will be central to success. We aim to be the employer of choice across all roles and demographics. We will enhance our culture of empowerment through recruitment, development, recognition, innovative ways of working, and investing in fit-for-purpose facilities. A 100% commitment to health and safety will be central to our culture.

We will submit to the Minister a business case for replacing the Godley building at our Lincoln campus, which does not meet 100% of building code and has an outmoded design that does not facilitate collaboration across science groups and with other organisations, especially those participating in the Lincoln Hub Precinct. We will also consider clustering/hub opportunities in other locations to create close, collaborative working environments.

We recognise that there is a need for significant improvement in our communication and engagement with the wider public. This will be a major focus. A new Tier 2 role for Brand and Communications will drive change to better articulate the outcomes and impact of publicly funded science (our 'success stories') and help to engage the public in more of our science – the practice of citizen science.

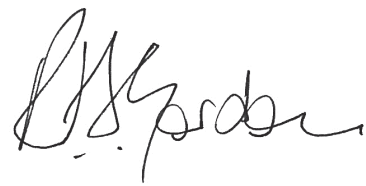
Sustainability is central to our business. Our contribution is largely through the impact of our science in New Zealand and overseas. More effective communication will include integrated reporting on the performance of Landcare Research against challenging sustainable development goals.

To maintain financial sustainability we will generate an appropriate overall return on our science that will ensure our continued viability as a leading research organisation. We will reinvest surpluses into the development of our people, capability, facilities, technology and science to further enhance our impact and reach. The 2017–22 years will be an exciting period of growing impact from our science and technology, founded on excellent science and a high-performance culture.



Jane Taylor

Chairman



Dr Richard Gordon

Chief Executive

Our Strategic Focus

Natural resources management

Several significant, system-level changes in the way New Zealand manages its natural resources have informed our strategic direction. These changes are far-reaching and have major implications for the country's science needs relating to land. They also reflect the new technologies available to scientists and communities, and the changing way New Zealanders think about, and engage with, science every day. Following are the key influences shaping our strategy.

The rise of 'hard' ecological limits: New Zealand is transitioning from a focus on environmental regulation to protect human health, to one that also protects ecological values and natural capital through limit-setting. Landcare Research has a key role to play to:

- ensure that defensible, science-based limits are based on best knowledge
- provide independent, science-based assessment of whether ecological limits are being met in line with regulation
- understand how cumulative limits 'sum up' in terms of New Zealand's environmental performance.

The rise of people-centred environmental decision-making, management and governance:

Communities are increasingly involved in governance models, setting ecological limits and assessing the associated potential economic, social and/or cultural trade-offs involved in meeting those limits. Landcare Research will have a key role in ensuring that integrated scientific information is presented in ways that support community and iwi decision-making.

The rise of consistent, globally comparable environmental performance measures: New Zealand has committed to measuring and reporting on the state of and trends in its environment, as well as the effectiveness of its conservation and resource management legislation, regulation, policy and operational practices. Landcare Research can lend expertise to develop and implement indicators, methods, and reporting and assurance frameworks.

Science sector trends

The rise of 'open data' expectations: Globally and domestically, data is increasingly seen as an asset that can unlock significant value. The Crown, shareholding Ministers and end-users in both the public and private sectors have increasing expectations of more open, accessible data to support 'open government' and transparency of decision-making, and to generate new value. Landcare Research plays a leading role in open data, acting as a 'champion' in the science system.

The rise of 'citizen science': Citizens are increasingly using communication technology and social media to 'do their own science', including data collection and analysis. Citizen scientists and professional scientists can work together to complement each other in support of national goals. There is a growing opportunity for Landcare Research to engage with communities, iwi and young New Zealanders on major environmental challenges – and solve them together.

The rise of digital technologies: Informatics, complex modelling and high-performance computing approaches can help deliver research in valuable new ways. Landcare Research will improve digital access to, and automated interpretation of, data from our collections, and investigate new artificial intelligence approaches to better 'mine' the value of digitised biological information for biosecurity and conservation benefit.

The rise of molecular technologies: As an example, new gene-based technologies are having a major impact on research horizons across the science system. Given our high level of science excellence and our mission-led approach to research delivery, Landcare Research will evaluate and where appropriate adapt some of these new technologies for New Zealand circumstances.

National goals, strategies and roadmaps

Recent years have seen the development of a number of guiding documents that are highly relevant to our strategic direction and have influenced our planning. These include:

- the Government's [Business Growth Agenda, He Kai Kei Aku Ringa \(the Crown–Māori Economic Growth Partnership\)](#) and [Vision Mātauranga](#)
- The Treasury's [Living Standards Framework](#)
 - the [New Zealand Biodiversity Strategy, Biosecurity Strategy 2025](#), the [National Policy Statement for Freshwater Management, New Zealand Antarctic and Southern Ocean Science Directions and Priorities 2010–2020](#)
- the [MPI Science Strategy](#) and other associated MPI strategies (e.g. soils, cadmium)
- the Ministry for the Environment's Environment Domain Plan 2013, the [Regional Council Research, Science and Technology Strategy](#), the [Predator-Free 2050](#) initiative, and the [Conservation and Environment Science Roadmap](#) (and draft roadmap for the primary sector).

Our science strategy is also closely aligned with the Biological Heritage and Our Land and Water NSC research strategies. Various primary sector strategies also set out relevant research priorities (e.g. Beef and Lamb NZ, Dairy NZ and Federated Farmers), as do the forthcoming suite of environmental indicators to be regulated under the [National Environmental Reporting Act 2015](#).

Evolving client needs

As part of our strategy development process, Landcare Research has focused on meeting client needs as they evolve. Examples are:

- scaling up research programmes to deliver 'whole solutions' to national needs
- delivering more integrated research that brings together environmental, economic, social and cultural interests and values
- increasing Māori-centred research
- delivering research that more effectively spans research domains (e.g. research that integrates land and water research)
- conducting research at larger spatial scales – catchment, regional, national and global
- addressing human behaviour, and the barriers to better natural resource management practice
- deepening our investment in high-risk/high-reward mission-led science
- developing new technologies and techniques for greater impact from science investment (remote-sensing, genomics, data/digital, smart phones/apps, new modelling approaches)
- deepening investment to develop 'real-world tools' and solutions further along the value chain for use by non-technical users, such as Māori, the public and landowners
- enhancing science translation, which is increasingly needed to support local, regional and national conversations with communities and iwi
- focusing our research collaborations more deliberately to achieve the 'right teams', both nationally and internationally, to achieve national outcomes
- deepening our strategic relationships and developing new partnerships to widen the relevance, impact and value of our work to sectors, including and outside the natural resources sector.

People-centred organisation

The most important element in Landcare Research achieving its goals and benefit to New Zealand is people. Our strategic focus will be on our people, our partners, our infrastructure and our sustainability as an organisation.

Our people

- We are creating a culture that attracts, develops, rewards and retains the right talent.

- We are setting high standards and recognising performance as well as continuous learning.
- We all benefit from an injury- and illness-free workplace, where everyone goes home safe and healthy each day.
- We value diversity, agility, collaboration and autonomy to contribute.

Our partners

- We depend upon our relationships to achieve impact from our science.
- We actively support the National Science Challenges (especially the Biological Heritage NSC) and the Lincoln Hub Precinct, in which we are a leading partner.
- We aim to be the preferred partner for Māori, helping achieve their aspirations for their land and resources.
- We are developing new strategic partnerships to enhance our science impact through organisational alignment.

Our infrastructure

- We are creating infrastructure fit for the future – our buildings and workspaces, and our ICT and science equipment.
- The proposed new building for our Lincoln campus is a major project for 2017–19. We are considering options for Tamaki and renovation plans at other sites.
- Our workspaces will evolve to reflect the changing needs of science and the expectations of a new generation of staff.
- Where appropriate, we will encourage co-location with relevant organisations to enhance our impact.

Our sustainability

- We are enhancing people and project leadership to manage delivery, capacity and pressure on our people.
- We are investing wisely to prepare the organisation for the next two decades.
- We are diversifying revenue to enhance impact (e.g. through commercial tools and products) and to manage financial risk.
- We are reporting our sustainable development performance against challenging goals using an integrated reporting approach.

New Zealand’s Biological Heritage National Science Challenge

New Zealand’s economic, environmental and cultural prosperity are heavily dependent on our biological heritage, elements of which are in decline or at risk from exotic threats. The mission of the Biological Heritage National Science Challenge (Biological Heritage NSC) is to reverse this decline through national partnerships that bring together researchers from across institutions and disciplines to transform the way we manage biodiversity, improve biosecurity, and enhance New Zealand’s resilience to harmful organisms.

Landcare Research is the host for the Biological Heritage NSC, which has a total of 17 collaborating parties. Challenge parties span the research community, government agencies, non-government organisations, business, Māori and the public. Landcare Research is contractually responsible to MBIE for delivering the Challenge’s work programme. Over \$25 million was committed to the Challenge over the first five years (2014–19), with substantial further funding provided from Challenge partners, including Landcare Research. We lead two of the three Challenge research programmes and provide operational support to the Challenge’s governance and management.

Following a review of governance and management, changes were made to how the Challenge uses its advisory groups. With the Challenge projects nearly all underway and funding allocated, the focus on monitoring and review is increasing. The review process will empower project teams to adapt their projects in response to initial progress and findings, and to changes in the external landscape (e.g. key initiatives like Predator-Free 2050 and Biosecurity 2025, or new funding from industry,

philanthropic organisations and other government programmes). This year will be important as the Challenge works with Challenge parties to clarify research priorities and gaps to shape the direction of aligned research with the Challenge mission, and therefore build towards achieving its ‘additionality’, which is a key concept for this Challenge. (www.biologicalheritage.nz).

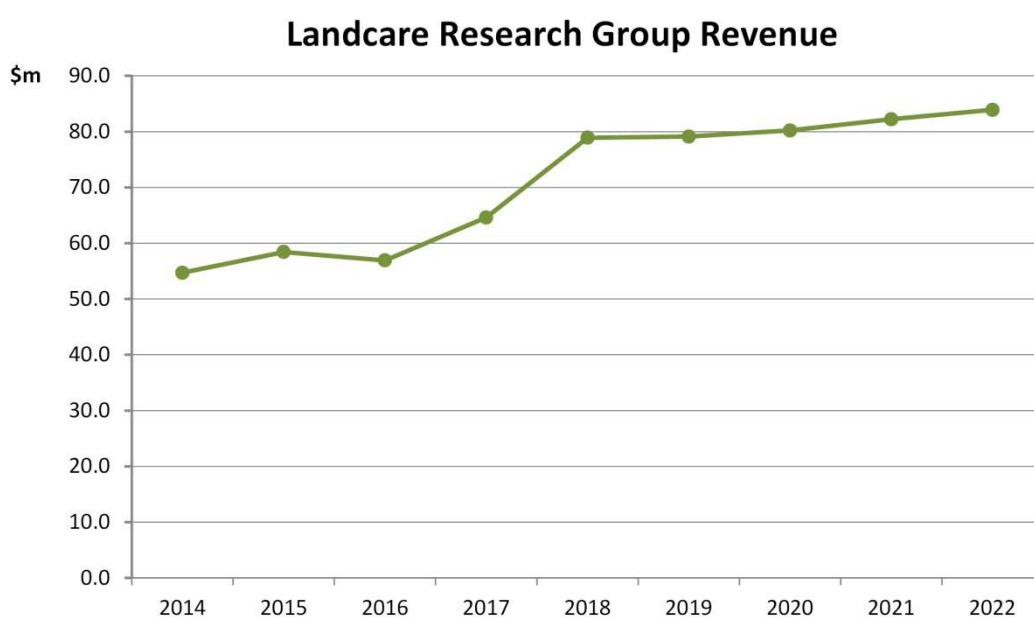
The Lincoln Hub Precinct

The Lincoln Hub Precinct partners¹ will collectively deliver innovative land-based research, education and precinct opportunities to customers to grow a sustainable land-based sector, both in New Zealand and internationally. The Hub is a key part of Landcare Research’s strategy to increase our scientific impact through working with the primary sector as it aims to operate within environmental limits and meet the expectations of its customers and local communities. Our science and experience with the regulatory environment are very relevant to these needs.

Working with our Hub partners we will create opportunities in two strategic areas. The first is to engage international agri-sector customers in the Hub. Landcare Research is taking the science lead in an early example with a global irrigation company. Such engagement will connect our science with the global cutting edge, accelerate technological development in New Zealand, and take our technology to the world. The second strategic aim is to accelerate multidisciplinary and co-design science projects. Landcare Research intends to replace the substandard Godley Building using a design that enables co-location of partner science staff and science users in project-based teams for the duration of projects. This is an especially important strategy for the NZ Biological Heritage NSC, which we host at Lincoln.

Our financial resilience

The five-year financial plan reflects a step change in activity during 2017 and 2018 resulting from success in recent funding rounds and Landcare Research’s leadership of the Biological Heritage NSC. This is followed in the out years by modest but steady revenue growth with a continued focus on productivity and efficiency gains.



¹ AgResearch, Landcare Research, Plant & Food Research, Lincoln University and DairyNZ

Māori Relationships and Vision Mātauranga

Giving effect to the MBIE Vision Mātauranga (VM) policy is a key driver of our research. In 2016, 130 of our research projects (approximately 17% of our total projects, including commercial projects) were explicitly relevant to Māori (i.e. VM rankings of 2–5).

We have a long history of working with different iwi, hapū and Māori organisations. Increasingly we are engaging with wider Māori interests; for example, through partnerships with Te Tumu Paeroa, the Federation of Māori Authorities (FOMA) – Me Uru Kahikatea, Ngā Whenua Rāhui, and Ngāti Porou Miere, among others. We work directly with pre- and post-settlement entities to co-identify the immediate and longer-term needs of iwi emerging from Treaty of Waitangi settlements. We then deliver responsive and constructive guidance and evidence for Māori to develop their own approaches and tools. Such relationships are already in place with Ngā Tāngata Tiaki o Whanganui, the Tūhoe Tuawhenua Trust, the Waikato Raupata River Trust, Te Kōpere o te iwi o Hineuru Trust, and Maungaharuru-Tangitū Trust. In addition to Te Ture Whenua Māori Act reforms, new conservation legislation is likely to facilitate even stronger working relationships (following Te Urewera Act 2014).

We refreshed our Māori Strategy in 2016 to identify the key priorities for Māori in land and natural resources research, and to ensure we have the necessary skills and capability to deliver on these. We will have achieved our strategic objectives if Landcare Research is the lead provider of research and innovation for the benefit of Māori and iwi natural resource decision-makers in New Zealand.

The strategy also sets out an end-user-centred approach to Māori engagement. Many of those who helped us develop the strategy indicated this was the first time a collective view on Māori research priorities has been developed. It signals a new way of working for the whole science sector.

The concept of co-innovation sits well in such an approach, and includes:

- partnering with Māori to identify research priorities and questions
- co-designing research processes
- co-implementation of research, including opportunities for collaborative research to build the capacity of Māori end-users and embed mātauranga Māori within research
- agreeing the most appropriate and effective research outputs to optimise end-user benefits
- collaboration on sharing of research finding
- up-front agreement on ownership of intellectual property.

A 2013 report by the Ministry for Primary Industries, *Growing the Productive Base of Māori Freehold Land*, estimates that around 1 million ha of Māori freehold land could be brought into productive pastoral use, highlighting the opportunity for Landcare Research to help lift the performance of these under-utilised land resources. We will continue to work closely with organisations such as MBIE, Te Puni Kōkiri, LINZ, FOMA and Te Tumu Paeroa to add value to cross-sector work supporting the development of Māori land through the use of our land information and tools. Engaging directly with Māori decision-makers and kaitiaki over Māori land and natural resources is an ongoing focus this year.

Last year Landcare Research initiated consultation with iwi, Māori landowners and others to identify research priorities that would provide the tools and information to make more informed decisions. The priority areas identified now form part of our refreshed Māori Research Strategy. They include land and soil information, soil erosion and flood mitigation, the provenance and future-proofing of mānuka honey production, biodiversity, pest and weed control, and improved catchment health and water quality. In working in these areas, Landcare Research brings its expertise to help build Māori science capability, as well as our own internal proficiency in mātauranga Māori. We expect to make further new appointments to increase our capability to provide relevant land advisory services to Māori end-users.

Landcare Research's Core Purpose

Landcare Research's Core Purpose is to drive innovation in New Zealand's management of terrestrial biodiversity and land resources to protect and enhance the terrestrial environment and grow New Zealand's prosperity.

Our national outcomes

With innovative science leadership and effective collaboration with our stakeholder partners to apply research, we will:

- improve the measurement, management and protection of New Zealand's terrestrial ecosystems and biodiversity, including those in the conservation estate
- achieve the sustainable use of land resources and their ecosystem services across catchments and sectors
- improve the measurement and mitigation of greenhouse gases from the terrestrial biosphere
- increase the ability of New Zealand industries and organisations to develop within environmental limits and meet market and community requirements.

Our key stakeholder partners are the natural resources sector, businesses implementing sustainable good practice, Māori and science organisations, and the New Zealand public.

Our impact areas

As part of our strategy development processes, Landcare Research has centred its research activity on the following six impact areas, which reflect national and sector priorities and provide a more accessible 'public face' to our research in support of our four National Outcomes:

Impact Areas	2024 Objective
Save treasured species	Recovery plans are restoring species
Control high-priority pests	New technologies are pushing back predators, weeds and diseases
Look after the land	Land, soil and water indicators are improving
Support Māori aspirations	Landowners are achieving sustainable economic development
Reduce carbon emissions	Net emissions are on-track to meet targets
Verify environmental performance	Credible performance data underpins national and local action, and enables benchmarking against market and community expectations

Our scope of operation

Landcare Research is recognised as the lead Crown Research Institute (CRI) in the following areas:

- catchment-level ecosystems (including wetlands) and related ecosystem services
- terrestrial vertebrate pest control
- terrestrial carbon processes and inventory, and other greenhouse gases from soil and land
- land cover, land-use capability and effects, and spatial land information that integrates across sectors and scales
- soil characterisation, processes and services
- integrated social and biophysical research to support the sustainable management of terrestrial biodiversity and land resources.

Landcare Research is expected to work with other research providers and end-users to contribute to:

- biosecurity, land, soil and freshwater management
- climate change adaptation and mitigation
- industry and business environmental performance, including verification
- indigenous forestry
- urban environments
- Antarctica.

In improving the outlook for biodiversity, society, the economy and Māori, Landcare Research contributes to a set of four National Outcomes (defined in our Statement of Core Purpose – SCP), working where society and the economy intersect with the environment. To achieve this, we deliver research to our key stakeholder partners across six Impact Areas (see page 2), empowering the users of our research and technology with new and improved tools, and the ability to make better decisions on natural resource conservation, management and sustainable use.

To facilitate this process, Landcare Research must maintain and build enduring relationships with users. A key mechanism for achieving this is our Outcome Advisory Panel, which consists of senior representatives from key stakeholder organisations in central and local government, industry and business, the primary sector and iwi. The Panel meets with our Senior Leadership Team and provides high-level strategic advice to our Board of Directors. NSCs and regional initiatives are furthering such connections, entailing much wider collaborations with stakeholders and other research providers.

Within research initiatives, our citizen science is growing. Citizen science cultivates public engagement with science and technology and builds trust between New Zealand’s science system and the public. This contributes to outcomes signalled in the National Statement of Science Investment (NSSI) and our research.

To achieve our National Outcomes, we must also ensure strong financial resilience, grow the capability and leadership potential of our people, ensure effective communications and engagement with our key stakeholders – clients, national and international collaborators – and maintain and develop critical research and other infrastructure.

Research horizons

The NSSI 2015-2025 identifies three horizons of research activity: leveraging proven ideas, developing emerging ideas, and generating new ideas. It seeks, like other investment portfolios, an appropriate mix of riskier, more speculative, high-potential activity and programmes with better understood, more predictable outcomes. Pertinent to Landcare Research as an environmental research provider, it states that ‘Government’s role as a long-term, principal investor is clearest in the ‘generating new ideas’ horizon, where the social returns are potentially high, but private returns too uncertain for most private investors’.

Increasingly, it is important that we understand our research horizon profile so we can actively manage across revenue sources to provide an integrated portfolio of investment. Improved understanding also allows us to navigate the cyclical nature of horizon science investment and proactively manage our pipeline of work.

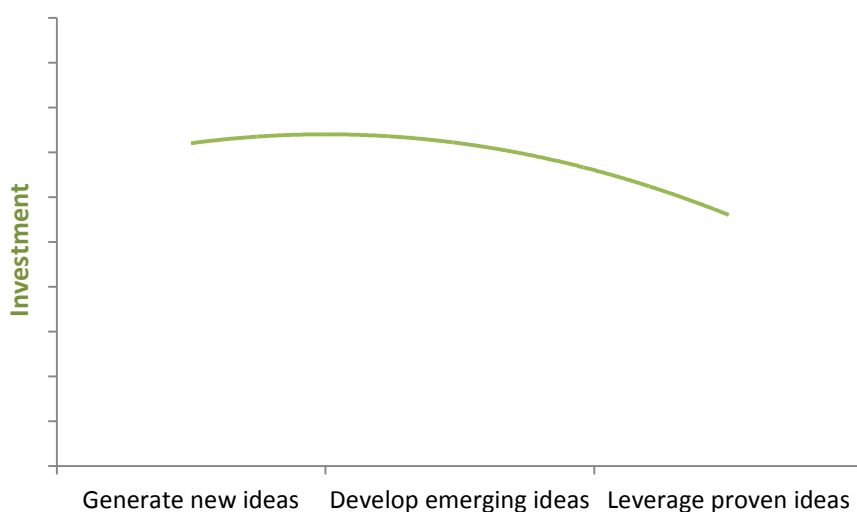


Figure 1. Research Horizon 2017/18 forecast: 36% generating new ideas, 36% developing emerging ideas, and 28% leveraging proven ideas.

Annual planning and reporting

Our new Strategy 2022 will be used by science staff to set our future direction. Other important strategic documents and inputs include our SSIF Programme and Infrastructure Platform plans, our Māori Strategy, our digital and collections strategies, our capability priorities, and our positioning alongside NSCs. Our thinking is influenced and shaped by leadership from the Minister and our Board, guidance from our Outcome and Science Advisory Panels, and our market knowledge and research-driven opportunities. Together these provide direction and input for our annual planning workshops and subsequent detailed plans.

Following these planning workshops, Science General Managers propose portfolio SSIF allocations to the Senior Leadership Team and then to the Board. Funding allocation proposals include an analysis of the rationale for the proposed portfolio investment, including expected internal impacts from any funding shifts. Our allocation process is guided by a set of principles to enhance delivery against our SCP outcomes. A key principle is enhancing our science excellence and impact, as expected by the NSSI. Other principles include enabling our stakeholder partnerships, developing our capability, and growing the value from our collections and databases.

Annual planning and allocation of SSIF culminate in our Statement of Corporate Intent (SCI), and more detailed internal documents such as our Annual Science Plan.

As part of our performance monitoring framework we regularly assess and report on progress against our activities, impacts and outcomes, including via quarterly reports to MBIE and our annual report. The NSSI signalled the need for improved evaluation, monitoring and reporting across the science sector, with a focus on impact and a need for a system-wide monitoring, evaluation and information system.

In 2016/17 we revised our Outcome key performance indicators (KPIs) to those nationally recognised as best measures. By sharing Outcome measures across agencies, we acknowledge we are one of many contributors to these national goals and create a common starting point for collaboration discussions. This also aligns with the State Services Commission's call for improved state service collaboration. We also widened our view of impact KPIs, moving from the previous narrow focus on single examples towards an integrated suite of quantitative and qualitative measures. Our new measures range from resource inputs to project completion rates, to the difference we have made to the environment and the social, cultural and economic well-being of New Zealanders.

In 2017/18 we will work with MBIE to incorporate SSIF-related KPIs into future SCIs and reporting, and to leverage opportunities offered by the Domain Plan and the associated National Research Information System.

National Outcome 1: Reversing the Decline of New Zealand's Biodiversity

Improve measurement, management and protection of New Zealand's terrestrial biodiversity, including in the conservation estate

Relevant national goals

- By 2025 New Zealand's biological heritage is more resilient and its decline is reversed (BioHeritage).
- New Zealand is protected from biological risks through an effective biosecurity system (Ministry for Primary Industries – MPI).
- Māori are managing their interests in biodiversity, reflecting different iwi and hāpu priorities, and sharing in the benefits of its use, to support their economic and social aspirations and fulfil their responsibilities as kaitiaki (New Zealand Biodiversity Strategy).
- New Zealand is rid of its most damaging introduced predators that threaten the nation's natural taonga, economy and primary sector (Predator-Free 2050).

Background

The integrity of New Zealand's iconic natural heritage is central to our identity, culture and lifestyle. It is also important to our economy, through its market access value and the provision and regulation of freshwater, pollination, waste clean-up and other ecosystem services. Inter-generational responsibility for the management of native ecosystems, expressed through kaitiakitanga, is central to Māori aspirations.

New Zealand's biodiversity is in decline. It is under increasing threat from invasive species, climate change, land-use intensification and conversion, mining, urban development and a variety of other pressures.

We work with the Department of Conservation (DOC), MPI, regional councils, iwi, wildlife sanctuaries, non-governmental and community groups, as well as business to improve New Zealand's biodiversity management and biosecurity. We also contribute through major national initiatives such as the Biological Heritage NSC, Better Border Biosecurity, and Predator-Free 2050.

Outcome 1 SSIF funding

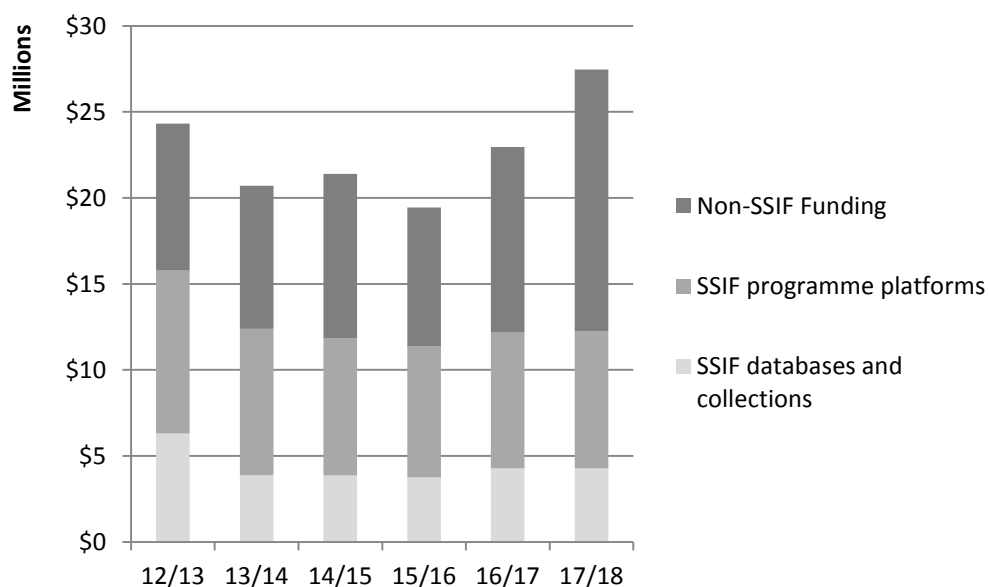


Figure 2. Outcome 1 Funding Trends. Amounts for 2016/17 and 2017/18 are the forecasted figures. (Note: excludes Biological Heritage NSC funds dispersed to other organisations).

The relatively large allocation of SSIF funding to Outcome 1 reflects Landcare Research's national leadership in public-good biodiversity research, as well as our custodianship of several biologically based Nationally Significant Databases and Collections. Our biological databases and collections play a critical role in protecting New Zealand's native and productive species and landscapes from biological risk by providing authoritative species identification and risk assessments. This is a key activity in demonstrating pest and disease freedom to maintain market access for New Zealand primary sector goods.

In 2013/14 some Outcome 1 funding was realigned to Outcome 4 to better support New Zealand's access to export markets through a greater focus on high-risk species and species of particular interest to the primary sector. In 2014/15 we reprioritised some resources to focus more on biodiversity management to better support conservation agency and community efforts to protect species, restore habitat and better manage and monitor valued biodiversity. In 2015/16 a small amount of Outcome 1 funding was realigned to support Outcome 2, reflecting the increased focus on supporting biodiversity preservation and enhancement through more sustainable land management practices on private land. In 2016/17 we continued to recognise that much of New Zealand's biodiversity is on private land, outside the Conservation estate, and new tools, approaches, policy instruments and incentives are needed to protect biodiversity on private land, including Māori-owned land.

In 2017/18 there will be more of a focus on novel technologies (e.g. to achieve predator freedom goals) and a shift in emphasis from a focus on characterising land-based ecosystems towards research to improve the management of them, including through the development and application of new tools, technologies and approaches. A further shift will be 'scaling up' research to achieve (and be able to demonstrate) landscape-scale outcomes. Our work will increasingly focus on delivering benefit to primary sector and Māori interests.

These shifts are well aligned with the NSSI directions of improving New Zealand's environmental evidence base, and balancing productivity and sustainability. The 2017/18 research direction also aligns well with several of the five-year priorities in the Conservation and Environment Science Roadmap:

- biosecurity: widely accepted, affordable solutions to invasive pests, weeds and diseases with high-risk conservation, economic or health implications
- integrated ecosystems: predicting environmental thresholds/tipping points in natural ecosystems
- species and population: cost-effective technologies to manage threats to native species, particularly to achieve 'Predator-free 2050' and improved tools for completing taxonomic inventories of coastal and oceanic species and land-based invertebrates
- taxonomic collections and expertise: discovery, documentation and improving our knowledge of high-priority biota and up-to-date taxonomic collections and taxonomic expertise
- mātauranga Māori: integration of mātauranga concepts to provide more system-wide solutions to environmental management.

A significant proportion of our Outcome 1 SSIF funding will be aligned with New Zealand's Biological Heritage NSC. This recognises that, overall, Landcare Research is the largest provider in New Zealand of biodiversity research, and much of our research will be crucial to the Challenge achieving its mission of reversing the decline in New Zealand's biodiversity.

Contributing impact areas

As the figure on page 2 shows, four impact areas contribute to Outcome 1. For three of the impact areas, relevant 2017/18 research focuses are:

Save treasured species:

- determining the natural genetic variation in kauri (*Agathis australis*) to inform population testing for resistance to kauri die-back

- evaluating the benefits of incorporating soil fertility and stand structure into local, regional and national-scale models forecasting mast seed fall events in southern beeches
- using long term ecological data for understanding ecosystem resilience and for providing baselines to aid restoration and conservation planning

Control high-priority pests:

- improving surveillance, detection and control technologies and strategies for pest organisms
- refining methods and approaches to increase the success rate of weed biocontrol agents
- scaling up activity to optimise large-scale approaches to pest control

Support Māori aspirations:

- Māori worldview for conservation and environmental planning developed and elucidated by cultural expressions

Databases and collections and associated infrastructure

Contributing to Outcome 1, for 2017/18 we will continue to enhance the relevance, impact and use of collections-derived knowledge by:

- developing new species identification tools on high-priority species for end-users
- digitising and developing information systems to improve access to species information online
- investing in succession planning for capability and infrastructure
- building on our system leadership on taxonomic collections custodianship and data-sharing, including participating in a cross-agency response to the 2016 Royal Society of NZ report on biological collections.

We will invest more in describing and databasing specimens and associated information about land invertebrates (insects), in line with five-year priorities identified in the Conservation and Environment Roadmap.

Key performance indicators

Impact areas

- 70–80% of SSIF-funded research outputs are on-track or completed
- 80–90% of success measures for Research Focus Area key research initiatives are achieved (three-year rolling average, noting that, as a new measure, it will be only partially reported in the first two years).

Outcome

Measurement of progress towards Outcome 1 is informed by a suite of agency KPIs to which Landcare Research impacts contribute:

- improving trends in the conservation status of indigenous species (Statistics NZ / Ministry for the Environment – MfE)
- by 2025, 50% of New Zealand's natural ecosystems benefit from pest management (DOC, stretch goal)
- the health of the biosecurity system is improving (MPI).

National Outcome 2: Sustainable Land Management

Achieve the sustainable use of land resources and their ecosystem services across catchments and sectors

Relevant national goals

- By 2025 New Zealand has achieved a 20% improvement in key indicators of land and water resources at farm and catchment scales (Our Land & Water NSC).
- The quality of our natural resource base improves over time, while sustaining the growth needed from key sectors to meet our 40% exports to GDP target (Business Growth Agenda).
- New Zealand realises the potential of Māori-owned natural resources (He Kai Kei Aku Ringa, the Crown–Māori Economic Growth Partnership).
- New Zealand’s freshwater is well governed and sustainably managed (natural resources sector).

Background

New Zealand’s land resources sustain primary sector production, provide habitat for our valued biodiversity, and provide ecosystem services (e.g. clean water, fertile soils and the aesthetic and intrinsic values upon which New Zealand’s economy, tourism and identity are based).

The demand for environmental information and new tools to support effective management of land resources in New Zealand is both urgent and growing. Some of our most important natural resources have been over-allocated or have reached critical environmental thresholds as a result of unsustainable land-use practices.

Effective management of land resources requires improved knowledge of their variability and change over time, and across catchments and landscapes (natural, managed and urban); their response to human impacts; and potential limits for land-use intensification and other development. New and improved tools are required to meet these challenges. Such knowledge supports sustainable land management and resource allocation, improves the economic and environmental performance of the primary sector, and supports the provision of wider ecosystem services.

Outcome 2 SSIF funding

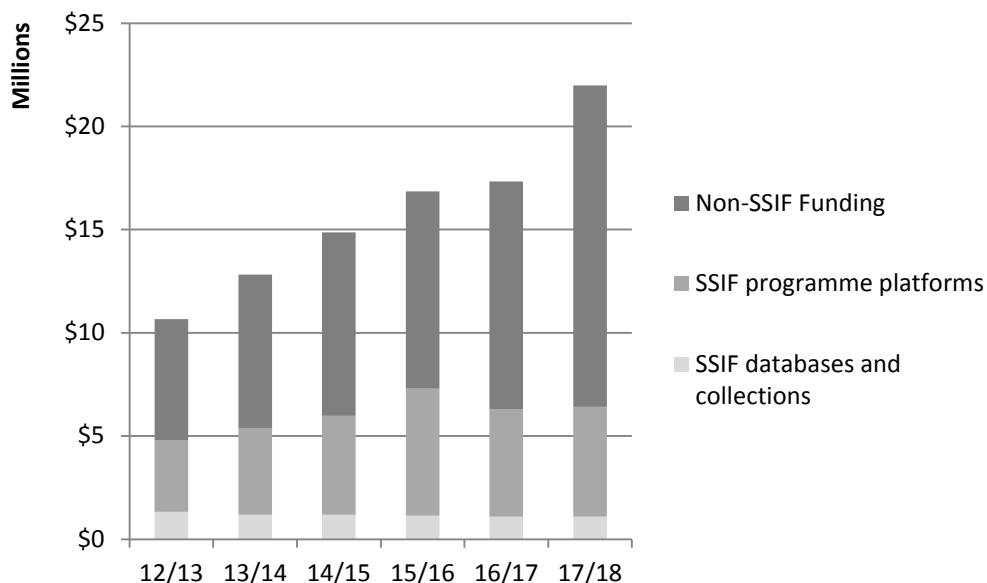


Figure 3. Outcome 2 funding trends. Amounts for 2016/17 and 2017/18 are the forecasted figures.

In 2012/13 and 2014/15 we increased funding in this outcome to meet the growing demand for information on the status of and pressures on New Zealand's land, and to boost research on tools, methods and technologies to support more sustainable land use. Some Core funding was also realigned from Outcome 3 to integrate research on soil carbon and nitrogen with other soils research. In 2015/16 we increased funding to support remote sensing and land-use research to meet the demand for cost-effective, large-scale environmental information and accurate data on land use and land-use impacts to support more sustainable land use, and setting and meeting water-quality limits as part of the water management reforms. In 2016/17 we continued to scale up our nationally leading soils and sediment research, as well as investing in new technologies and approaches to advance soil and land resource mapping and deliver this in more effective ways to users. We also increased support for research relevant to Māori agribusinesses, including in the native honeys business.

A growing focus in 2017 is research to accelerate characterisation of the land environment and to support the recent suite of freshwater reforms under the National Policy Statement on Freshwater Management. There is a growing need for understanding at a much finer scale about land cover and land use, and how land-use practices are affecting freshwater and marine environments. These dual drivers will continue to drive significant investment in our soils, sediment and erosion science, and our informatics and remote sensing research, as well as activities to make associated data and information available for integration into science models and tools.

These shifts are well aligned with the NSSI directions of improving New Zealand's environmental evidence base; our understanding of environmental opportunities and limits to underpin economic goals; and balancing productivity and sustainability.

The 2017/18 research direction aligns well with several of the five-year priorities in the Conservation and Environment Science Roadmap:

- environmental monitoring: new/improved tools for gathering/reporting data on the condition of and trends for land, freshwater, air and marine environments
- monitoring, data sharing and infrastructure coordination:
 - national data coordination and information exchange
 - protocols for open data access
 - technical innovation in big data and remote sensing
- freshwater: a better understanding of how contaminants, including excess sediment, affect ecosystems to inform management of land and water use
- mātauranga Māori: integration of mātauranga concepts to provide more system-wide solutions to environmental sustainability.

Increasingly, our work in this Outcome is connected to and aligned with the research priorities of the Our Land and Water NSC, particularly in the areas of sediment, erosion, soils and soil health, and interoperable modelling of the land-use pressures on waterways.

Contributing impact areas

As the figure on page 2 shows, three impact areas contribute to Outcome 2. Within each impact area the relevant 2017/18 research focus areas are:

Look after the land:

- down-scaling key research methods, models and data sets to provide more accurate farm-scale information, tools and advice
- developing new tools to manage pressures on New Zealand's land and soils (e.g. contaminants, nutrients, microbes and loss of versatile land)
- advancing technologies to increase water and energy efficiency, including for irrigation and drainage
- filling key knowledge gaps in soil processes, ecosystem services, the C-N-water cycle, and societal values relating to land

- better understanding of soil C and N dynamics, and leaching and microbial interactions
- characterising and modelling ecosystem services to improve land-use decision-making for multiple outcomes (water quality, land productivity)

Support Māori aspirations:

- developing new approaches and tools to support Māori agribusiness and Māori land development
- integrating research, tools, processes and information to enable and empower tangata whenua to exercise their role as kaitiaki

Verify environmental performance:

- quantifying the long-term effects of land use on soil health/resilience
- developing new, more accurate approaches to monitor and report the condition of land resources, and the risks facing these resources, including erosion susceptibility
- improving the coverage, scale, data quality and representativeness of New Zealand soil data
- extending digital soil mapping techniques to improve coverage of hilly and complex terrain
- enhancing land cover and land-use mapping via new remote sensing and data integration approaches
- improving the information infrastructure for land and soils data, including data standards
- improving the parameterisation, calibration and validation of national erosion and sediment models (e.g. SedNetNZ) and other key land-use-related models.

Databases and collections and associated infrastructure

The following collections and information systems provide underpinning information in support of sustainable land and water management practices:

- Land Resource Information System (LRIS), which comprises the New Zealand Land Resource Inventory (NZLRI) and the National Soils Database (NSD)
- next-generation National Soils Database Repository (NSDR).

The 2017/18 research direction aligns well with the Conservation and Environment Science Roadmap principles relating to collaboration ('data-sharing practices and data infrastructure, and citizen science, support national collaboration').

Key performance indicators

Impact areas

- 70–80% of SSIF-funded research outputs are on-track or completed
- 80–90% of the success measures for Research Focus Area key research initiatives are achieved (three-year rolling average, noting that, as a new measure, it will be only partially reported in the first two years).

Outcome

Measurement of progress towards Outcome 2 is informed by a suite of agency KPIs to which Landcare Research impacts contribute:

- improving trends in soil health (Statistics NZ/MfE)
- reducing soil erosion risk (Statistics NZ/MfE)
- an increasing number of monitored sites showing maintained or improved water quality (MfE)
- the productivity of Māori assets matches the national averages by 2040 (He Kai Kei Aku Ringa, the Crown-Māori Economic Growth Partnership)
- increasing GDP from land-based primary production (Statistics NZ data).

National Outcome 3: Reducing Greenhouse Gases

Improved measurement and mitigation of greenhouse gases from the terrestrial biosphere

Relevant national goals

- By 2030 New Zealand has reduced its greenhouse gas emissions to 30% below 2005 levels (New Zealand's 2030 climate change target).

Background

For New Zealand to meet its international greenhouse gas obligations it is necessary to have a robust inventory of net emissions and carbon storage at a national scale, and appropriate mitigation tools. In July 2015 the New Zealand Government announced that our post-2020 climate change target is to reduce greenhouse gas emissions to 30% below 2005 levels by 2030. This target was tabled at a United Nations meeting in Paris in December 2015 and signed at a ceremony in New York, on 22 April 2016. It will come into force for New Zealand once it has been ratified by at least 55 countries, representing an estimated 55% of global emissions (at least).

New Zealand will meet its responsibility targets through a mix of domestic emissions reductions, the removal of carbon dioxide by forests, and participation in international carbon markets. It will be important for New Zealand to be able to model the environmental and economic impacts of proposed emissions reduction targets, and to have access to effective mitigation options for reducing net emissions. The science challenges are substantial, as are the policy and land management challenges. Collaborative partnerships between research groups, government agencies and the primary industries sector are the key to meeting these challenges and delivering the National Outcome.

Outcome 3 SSIF funding

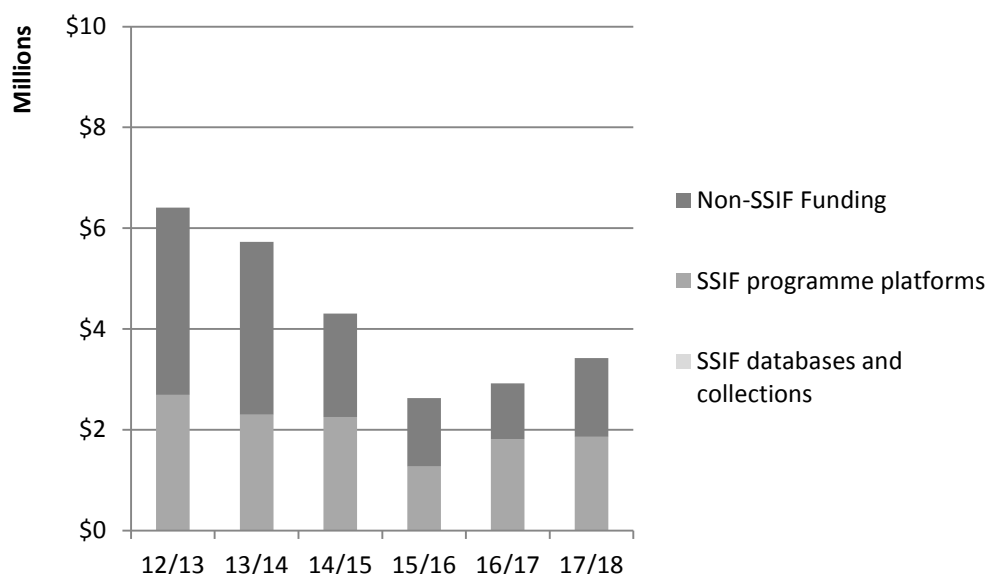


Figure 4. Outcome 3 funding trends. Amounts for 2016/17 and 2017/18 are the forecasted figures.

Some Core funding to this Outcome was realigned to support related research in Outcomes 2 and 4, where the focus on sustainable management of productive land and soils also supports the management of greenhouse gases and soil carbon. In 2017/18 we will continue this shift and also invest in research that will support on-farm greenhouse gas emissions reductions.

These shifts are well aligned with the NSSI directions of improving New Zealand's environmental evidence base and our understanding of environmental opportunities and limits to underpin economic goals, and with balancing productivity and sustainability.

The 2017/18 research direction also aligns well with several of the five-year priorities in the Conservation and Environment Science Roadmap:

- climate change: technologies/practices to reduce greenhouse gas emissions
- mātauranga Māori: integration of mātauranga concepts to provide more system-wide solutions to environmental management.

Contributing impact areas

As the figure on page 2 shows, three impact areas contribute to Outcome 3. For two of the impact areas, relevant 2017/18 research focuses are:

Reduce carbon emissions:

- developing and testing new mitigation technologies for reducing nitrous oxide emissions
- developing a process-based model that simulates soil N as well as plant and soil C dynamics in New Zealand pastures and forests
- improving understanding of key system responses to climate change (e.g. plant growth to CO₂)

Verify environmental performance:

- improving whole ecosystem modelling of the carbon cycle
- continuing to improve the accuracy of greenhouse gas emissions measurement and modelling
- more accurate scaling up and mapping of emissions/removals via new technologies and methods
- developing more accurate assessment of on-farm greenhouse gas emissions and removals
- establish soil carbon monitoring framework for pastoral land

SSIF-funded databases and collections, and associated infrastructure

Although no SSIF funding for databases and collections sits within this Outcome, Outcome 3 research programmes draw on the Land Resource Information System (LRIS), the National Soils Database (NSD) and the National Vegetation Survey (NVS).

Key performance indicators

Impact areas

The impact key performance indicators are:

- 70–80% of SSIF-funded research outputs are on-track or completed
- 80–90% of success measures for Research Focus Area key research initiatives are achieved (three-year rolling average, noting that, as a new measure, it will be only partially reported in the first two years).

Outcome

Measurement of progress towards Outcome 3 is informed by a suite of agency KPIs to which Landcare Research impacts contribute:

- improving trends in greenhouse gas emissions and removals in the annual National Greenhouse Gas Inventory (MfE)
- downward trends in the greenhouse gas intensity of the economy measured by emissions per unit of GDP and emissions per capita (MfE).

National Outcome 4: Development within Limits

Increase the ability of New Zealand industries and organisations to develop within environmental limits and meet market and community requirements

Relevant national goals

- The quality of our natural resource base improves over time, while sustaining the growth needed from key sectors to meet our 40% exports to GDP target (Business Growth Agenda).
- People are enabled to make and implement decisions that benefit society and the environment, enabling a prosperous New Zealand (MfE).
- Transforming the primary sector to realise the opportunity for Aotearoa New Zealand to be recognised for our natural environment and products (Te Hono Movement).
- Biological eradication of TB from New Zealand by 2055 (National Pest management Plan – TB Plan).

Background

New Zealand's prosperity is heavily dependent on its environment. The prominence in our economy of primary sector production, tourism and niche (e.g. film) sectors reliant on our landscapes highlights the fact that, in the long term, New Zealand's economic development can only be sustained by industries and businesses operating within complex environmental limits. This often entails balancing the diverse needs of multiple stakeholders, including government and local government, the private sector, Māori and the community. Increasingly, our work under this outcome supports Māori, business and community groups to engage in local decision-making on the future uses of, and values relating to, natural resources of importance to them.

Our research supports natural resources agencies tasked with developing and implementing effective environmental policy, regulation and land management practices for the sustainable management of land, water and ecosystem services. This includes supporting MPI and operational agencies tasked with managing New Zealand's biosecurity, and DOC, regional councils and land managers responsible for weed and pest management, as well as primary sector and Māori stakeholders whose livelihood and well-being depend on the sustainable management of natural resources into the future.

Outcome 4 SSIF funding

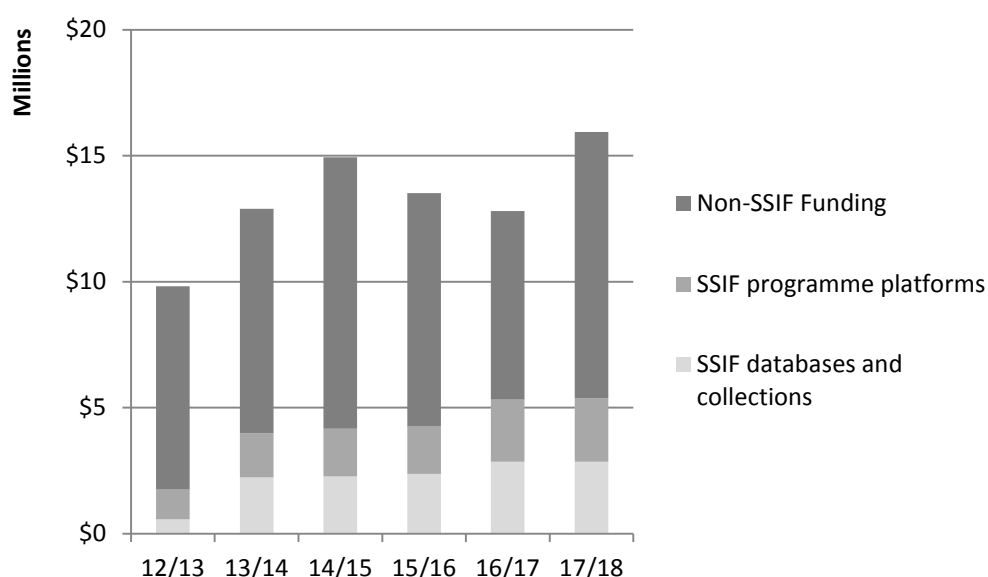


Figure 5. Outcome 4 funding trends. Amounts for 2016/17 and 2017/18 are the forecasted figures. (Note: excludes Biological Heritage NSC funds dispersed to other organisations).

The significant increase in Core funding in 2013/14 reflected a decision to redirect a portion of funding for our biological collections and databases from Outcome 1 to better support market access goals and primary sector biosecurity objectives. We also increased funding to this Outcome in 2015/16 to support the application of our core biodiversity, land and water research to meet the needs of the private sector and primary produce exporters. In 2016/17 we reinforced these earlier shifts in focus by investing more in research to support the sustainable development of the native honey industry; improve resilience in the primary sector; improve tools to optimise land use to maximise economic returns while minimising environmental effects; and build greater social 'licence to operate' for natural resource management activities (including pest control), where different perspectives can lead to conflict.

In 2017/18 we will continue to invest in integrative research, with a focus on improving our national models and tools. We will also invest more significantly in social and cultural research, including Māori-centred research. This focus is well aligned with the NSSI directions, which recognise that 'Primary industries are a significant user of natural resources, resulting in competition and conflict over issues such as freshwater, mineral extraction, biodiversity and climate change.'

The 2017/18 research direction aligns well with several of the five-year priorities in the Conservation and Environment Science Roadmap:

- biosecurity: widely accepted, affordable solutions to invasive pests, weeds and diseases with high-risk conservation, economic or health implications
- integrated ecosystems: models that assess the effectiveness of interventions, particularly freshwater restoration programmes, and:
 - improve understanding of how our use of land affects freshwater quality and ecosystems
 - help communities make resource management decisions with implications across land, water and oceans
- freshwater: a better understanding of how contaminants, including excess sediment, affect ecosystems to inform management of land and water use
- social and economic factors:
 - building social and cultural capital to manage the environment more effectively (including acceptance of new technologies)
 - comprehensive models of New Zealanders' values, beliefs and understanding of conservation and the environment
- mātauranga Māori:
 - integration of mātauranga concepts to provide more system-wide solutions to environmental sustainability
 - collaborative approaches that use mātauranga Māori to inform conservation/environmental policy and management
 - integration of mātauranga concepts to provide more system-wide solutions to environmental sustainability.

Contributing impact areas

As the figure on page 2 shows, four impact areas contribute to Outcome 4. Within each the relevant 2017/18 research focus areas are:

Look after the land:

- enhancing participatory processes to support policies, regulation and practice
- increasing capacity to undertake cost-benefit analyses
- better integrating the value of ecosystem services in policy, regulation and practice
- enhancing our economic modelling to support more informed land management decisions
- continuing to develop surveys to provide insight on primary sector decision-making drivers
- improving New Zealanders' ability to adapt and become more resilient to environmental change by:

- refining economic models to develop climate change policy and practice
- improving decision-support tools to show the impacts of resource management choices

Control high-priority pests:

- improved surveillance, detection and control technologies and strategies for pest species
- new DNA diagnostic tools for rapid identification of high-priority species of biosecurity concern
- new high-tech tools to reduce the number and extent of invasive mammals
- developing weed biocontrol agents to reduce costs and pesticide use by landowners and industry
- developing new tools to reduce costs and increase the acceptability and effectiveness of possum and rabbit control
- developing new, more effective approaches to multi-species predator control.

Support Māori aspirations:

- developing appropriate tools to support iwi decision-making on natural resources
- developing culturally appropriate tools to support iwi decision-making relating to natural resources

Verify environmental performance:

- more effective ways of demonstrating TB freedom in support of agricultural market access.

SSIF-funded collections and associated information systems supporting this work

The following collections and information systems underpin Outcome 4 activity in supporting national biosecurity goals and informing more sustainable land and soils management by primary sector organisations:

- New Zealand Arthropod Collection
- New Zealand Fungal and Plant Disease Collection
- International Collection of Microorganisms from Plants
- Allan Herbarium
- Land Resource Information System (LRIS), which comprises the New Zealand Land Resource Inventory (NZLRI) and the National Soils Database (NSD).

Key performance indicators

Impact areas

- 70–80% of SSIF-funded research outputs are on-track or completed
- 80–90% of success measures for Research Focus Area key research initiatives are achieved (three-year rolling average, noting that, as a new measure, it will be only partially reported in the first two years).

Outcome

Measurement of progress towards Outcome 4 is informed by a suite of agency KPIs to which Landcare Research impacts contribute:

- improvement in the quality of analysis and community involvement in plan-making, including Māori engagement (MfE)
- by 2026, verified eradication of TB from wildlife from at least 2.5 million ha (OSPRI)
- positive trends in the Te Hono Ake Ake Dashboard (Te Hono Movement)
- market access is maintained and opportunities enhanced, with trading partners having confidence in New Zealand's biosecurity system (MPI)
- increasing GDP from land-based primary production (Statistics NZ data).

Pathways to Impact

Landcare Research’s impacts are of interest directly or indirectly to nearly all New Zealanders for cultural, economic, philosophical, recreational, or a multitude of other reasons. The range of public and private entities and individuals actively involved in the care and management of New Zealand’s terrestrial biodiversity and land resources is extremely broad, as is the scale at which they operate – from individual citizens to government departments.

Organised by end-user group, we categorise six key pathways to impact (see Figure 6). Although there are common features in the underlying research, each group requires a distinctive series of pathways according to their characteristics and operational requirements and constraints. Understanding the pathways to impact at an entity level (e.g. DOC and MPI differ within the operational agency grouping) implies understanding the goals, operational needs, and key opportunities and barriers for each. To meet this challenge, we take end-users and stakeholders on a mutual journey (co-innovating), creating common purpose through early engagement, utilising feedback loops and ensuring outputs are fit for purpose. With this approach we achieve our shared goals. We also collaborate with other research entities, such as the National Science Challenges, to maximise impact. For 2017/18 we have aligned \$8.3m, \$2.1m and \$0.2m of SSIF to the Biological Heritage, Our Land and Water and Deep South respectively.



Figure 6. Key pathways to impact.

Infrastructure

Facilities

Landcare Research has an ongoing programme to upgrade buildings and research infrastructure at all its sites. Our buildings and facilities need to be fit-for-purpose to deliver effective research and outcomes in the future. This needs to be supported by smart systems and processes to enable our people to carry out their work.

Lincoln redevelopment

At Lincoln (our largest site and main office) we are working closely with the Lincoln Hub Precinct to ensure our redevelopment plans are consistent with this vision. Our immediate need is to re-house staff in the substandard Godley Building to safe, compliant accommodation. The new space will need to take into account the need for staff to work closely with each other and easily access specialised facilities. This also presents a well-timed opportunity to make step changes in:

- the way Landcare Research staff are able to work together in collaborative teams
- how the CRI presents itself to its partners, clients and the public, as a relevant and collaborative research organisation
- how it integrates its capabilities and resources with the Lincoln Hub Precinct partners and future co-locating businesses
- how it engages its staff and international talent – ideally as a modern, fit-for-purpose and desirable place to work.

Our key priority is to redevelop aspects of the Lincoln site to provide modern, fit-for-purpose facilities for our people. The reconstructed area will be designed to cater for our people, co-located Hub staff and co-creation with science users. We will continue to co-locate and support the Biological Heritage NSC centre and to identify opportunities to further enhance the efficiency and effectiveness of resources.

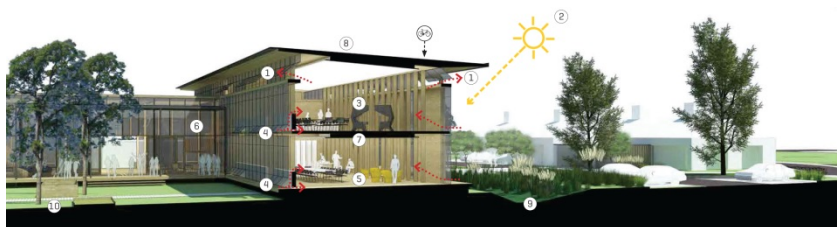


Figure 7. Concept drawing of the Lincoln redevelopment

Tamaki

The main impetus behind locating our facilities on the University of Auckland campus at Tamaki was to further collaborations between the organisations. Following the University's decision to divest and move away from their Tamaki campus, we have initiated a process with MPI (a key partner co-located with us at Tamaki) to consider future location options within Auckland.

Technology

Over the plan period (2017–2022) we will continue to make significant investment in our IT infrastructure to protect our data, support and enable high-quality science, and improve the resilience of systems. Landcare Research works closely with other CRIs to adapt best ideas and ensure IT systems are 'fit for purpose', affordable over the long term, secure, and take into account the very rapid innovation occurring in this sector.

Over the SCI planning period Landcare Research intends to:

- further develop capabilities and infrastructure to enable exploitation of 'big data'

- enhance technology to support productivity, effective project and information management, and science data management planning
- upgrade cyber security and IT system resilience
- enhance collaboration tools to enable better connectivity for devices and the ability to connect securely with external partners for easier collaboration – this is essential to enable greater staff mobility and utilisation of collaborative spaces expected in the design of the new facilities.

Collaborations

We remain committed to a number of collaborations, such as the National Science Challenges, Centres of Research Excellence (CoREs), and national and global research consortia such as collaborative research centres. We also partner in the National eScience Infrastructure (NeSI).

National eScience Infrastructure (NeSI)

Landcare Research is a partner in the NeSI investment by Government, universities and CRIs to build and operate high-performance computing facilities. NeSI enables us to carry out advanced modelling and other ‘big data’ analyses cost-effectively and time-efficiently. It also facilitates collaborations with international researchers. We continue to use the NeSI platform to advance our research and develop applications for end-users in a wide range of areas, including environmental and ecosystems management, invasive species, genomics, global change processes, and land information.

Enhancing the value of our databases and collections

Landcare Research is custodian of seven of New Zealand’s 25 Nationally Significant Databases and Collections. These are national science assets, some of which have been built up over more than a century. We periodically review collections policies and infrastructure to ensure they are fit-for-purpose, meet the curatorial standards required to maintain these valuable assets in perpetuity, and support systematics science undertaken by our staff and other researchers across the New Zealand science system.

In recent years we have made strategic investments to significantly enhance our collections infrastructure and protect these important national taonga on behalf of New Zealand (e.g. investment in improved temperature and humidity control, databasing images and data to safeguard against physical loss). We have also been investing significantly to put collections information and images online in digital format to increase the relevance, impact and reach of our collections. This will enhance the value of many decades of Crown investment in them, and better support both biosecurity and conservation outcomes for New Zealand.

Collection digitisation and biological distribution modelling

‘Digitising’ high-priority insect, plant, fungal and bacterial specimens and associated data from our SSIF-funded biological collections helps safeguard this information for future generations. Putting information online also ensures that New Zealand’s biosecurity and biodiversity agencies can access critical data whenever they need it.

We are investing in online availability of high-definition images, authoritative information on morphological and molecular characterisation, and accurate provenance and identification data derived from our biological collections. We are also using this online data to develop a real-time species distribution modelling platform to support biosecurity and biodiversity management decisions by policy, regulatory and operational agencies.

The platform will support end-users who need predictive information on high-risk biosecurity incursions and to undertake biodiversity risk assessments. It enhances New Zealand’s ability to answer fundamental questions such as, ‘What is this organism?’, ‘How do we recognise it?’, ‘Is it a threat or threatened species?’, and ‘Where did it come from, when did it arrive, and where might it spread under various scenarios?’

Enviro-Mark Solutions

Enviro-Mark Solutions Ltd (E-MS) provides environmental certification for business and industry through its CEMARS, carbonZero and Enviro-Mark and Energy-Mark programmes. It works with over 400 organisations in five countries, although its main customer bases are in New Zealand and the UK. E-MS is a wholly owned subsidiary of Landcare Research, and was established as a business unit in 2006 and as a stand-alone entity in 2011. A number of customers have maintained their certification with E-MS for 10 years or more. E-MS is accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ), and is also licensed by the UK Environment Agency. In 2016 E-MS became a CDP-accredited verification provider (CDP was formerly called the Carbon Disclosure Project).

The E-MS programmes and certification services are widely recognised as being among the most robust and credible available globally. These tools enable organisations to improve their sustainable business practices, demonstrate carbon reduction or carbon neutrality, and implement robust environmental management systems. Through its service to New Zealand businesses, E-MS contributes to Landcare Research Outcome 4 (Development within Environmental Limits). Through all its programmes and services, E-MS adds value to its customers by providing assurance for environmental performance claims, through cost savings and efficiencies, building capability, improving systems, changing culture, and inspiring innovation.

E-MS will continue to maintain clear market, geographical and sector focuses and will continue to grow its market presence. Strategic relationships form an integral part of the business model, especially for client auditing and overseas growth. Relationships will be strengthened or initiated to extend the range and value of customers using our services. We will continue to develop our software tools in order to scale the business for growth. Suitable international markets for growth are anticipated to be in those countries where governments and businesses are responding to compliance and voluntary developments arising from the 2015 Paris Climate Change Agreement. Through international engagement, E-MS will also maintain the high level of its knowledge of, influence on and alignment with such global standards and initiatives as the CDP, We Mean Business, and Science Based Targets.



E-MS provides a number of other related environmental services, including training, audit against the relevant standards, gap analyses, development of specific greenhouse gas calculators and emissions factors, assessment of the integrity of carbon credits, and supply chain assessment for carbon and environmental impact.

Although E-MS is a stand-alone company with separate premises in Auckland, it shares facilities and resources at our Lincoln and Wellington sites, and follows the same accounting and general business, good employer and EEO practices and processes as the parent company.

For further information, see www.enviro-mark.com/.

Capability and Culture

Capability planning and development

Our focus, in the current stable funding environment, is to increase capability in key areas of demand. We will do so within a 'whole of science system' context, recruiting directly in areas where Landcare Research is the national lead, and forming collaborative partnerships with providers in areas where they are the lead. We have the collaborative networks for this in place, as demonstrated by the subcontracting component of our new MBIE Endeavour funding (an average of 35%). The Biological Heritage NSC is another key collaboration for enhancing collective strength in our sector, and we anticipate the Our Land and Water NSC will have a similar effect.

As a national integrator we will primarily recruit staff with quantitative expertise, but will draw on qualitative expertise where needed. Key areas for recruitment are policy analysis, economics, spatial modelling, information technology, soil carbon/nutrients and associated greenhouse gas emissions, erosion/geomorphology, microbiology, pedometrics/pedology, and ecology. Modelling, real-time environmental sensing, data analytics and molecular tools will strengthen our core disciplines. We are also growing a 'social licence to operate' capability, which spans Landcare Research and our partner organisations. Predator-Free NZ initiatives will only increase this need. Focusing research on sector-led priorities for ecosystems, habitats or species will shift the emphasis for some biodiversity and systematics research. Science communication/public outreach is also a key component of continuing our prominence in these areas of national leadership.

With the rising influence of the Māori sector on environmental decision-making, our role as integrator is highly valuable. To this end, we will equip staff with the skills to improve achievement of this sector's aspirations, and increase our internal capacity for kaupapa Māori research.

Culture, leadership and bicultural development

Our people strategy focuses on creating a highly engaged workforce by providing meaningful work, an excellent work environment and opportunities for career growth. Other key initiatives focus on building trust and developing great leaders.

The second phase of our comprehensive Leadership Development Programme is well underway. This involves a more in-depth and applied approach to learning in relation to three key leadership competencies: leading change, stakeholder engagement and strategy development. We are also introducing a Future Leaders programme for a select group of high-performing individuals to identify their leadership strengths and weaknesses to produce a customised career development plan. The aim is to build our longer-term leadership pipeline. Our Senior Leadership Team will continue to support these programmes through their own ongoing development in leading leaders.

In late 2016 we facilitated our first Noho Marae stay and cultural competency training. Further sessions are planned for 2017/18 at both North and South Island marae. The General Manager, Māori Development (appointed in January 2017) will be responsible for supporting the People and Culture group to develop an organisational culture that celebrates our Māori links and the Crown's role as Treaty partner by building our bicultural capability and capacity.

Good employer, and health and safety

Our achievements against the seven key elements of being a good employer, as set out by the New Zealand Human Rights Commission, are reported on our public website and in our annual report.

Landcare Research has developed a three-year strategy for workplace safety, health and wellbeing. The vision for this strategy is to ensure all our workers are 100% committed to health and safety. Various projects to support this strategy are planned, including the development of a customised wellbeing programme and the implementation of a health and safety system for managing all workers, which will include the induction of non-employees and pre-approval of science contractors.

Science Excellence

Collaboration – within New Zealand and internationally

We have a strong track record in science excellence. In terms of the citation impact of our publications (2011–2016), Landcare Research is:

- in the top 16% of research organisations globally
- first in New Zealand, ahead of all the other CRIs and the universities
- in the top 10% of institutes worldwide for nine out of our thirteen major disciplines.

We aspire to be in the top 10% for all major areas of our science, including those where we are building new capability to meet changing needs in New Zealand. During the period 2011–2016 we produced 26 papers that so far have been cited more than 100 times, plus a further 45 papers cited more than 50 times. Twenty-eight of these papers were flagged by the Web of Knowledge as being ‘highly cited’.

Domestically, 35% of our non-MBIE revenue comes from research collaborators (other CRIs and universities). We also collaborate with 152 international organisations (these collaborations produce an average of 158 manuscripts per year with at least one international author). The next opportunity is to engage in large-scale, multi-partner research consortia. A recent example has been our engagement in international collaborations comparing data from our National Vegetation Survey databank with other, comparable data sets globally. In the last three years, this approach has resulted in two *Nature* papers, plus one each in *Science* and *Proceedings of the National Academy of Sciences*, and has facilitated globally unique insights into New Zealand’s biodiversity. We have also contributed to an Australian Collaborative Research Centre bid for ‘High performance soils’, which, if funded, will enable collaboration with a wide range of researchers and primary industries.

Links with universities and the Lincoln Hub Precinct

We have long worked with universities to grow capabilities and support the training of emerging scientists. We continue our commitment to our joint graduate school with the University of Auckland, with five of our scientists holding professorial or assistant professorial part-time roles. We are also contributing to the establishment of a postgraduate school with Lincoln University and other partners in the Lincoln Hub Precinct. The vision is to see the precinct attract the most able minds internationally to study and undertake research at Lincoln. The ultimate goal is for shared developments in infrastructure, and collaborative research and teaching activity that will result in better management of New Zealand’s land and water resources.

Science Advisory Panel

Our Science Advisory Panel has an important role in evaluating scientific quality. The Panel meets annually to review our performance, future research directions and capability needs. The purpose is to ensure our research is both excellent and relevant, and that we are taking advantage of key developments in international science. Each year the Panel is given material to read in advance and is then asked to concentrate on specific areas for review. Each meeting typically lasts three days, with formal presentation sessions, informal interaction with a range of our scientists to talk about their work, and a feedback session with our Board. These reviews take place in advance of our annual review of SSIF funding allocation.

Performance Monitoring and Reporting

Milestones for Landcare Research's strategic focus are:

- **Natural resource management:** develop an approach to integrated reporting with sustainable development goals
- **Science sector trends:** work with the Biological Heritage NSC to develop a common framework to assess opportunities for citizen science
- **National goals, strategies and roadmaps:** develop a strategy for domestic talent-share arrangements.
- **Evolving client needs:** further embed co-innovation approaches with key external users and partners to achieve greater impact from SSIF investment
- **People-centred organisation:** current and ideal culture defined and analysed; leadership development programme enhanced
- **Implementing Vision Mātauranga:** initiate at least two new major partnerships and/or joint programmes with Māori entities and agri-business
- **Biological Heritage NSC:** as a host, successfully fulfil all governance and support unit responsibilities
- **Lincoln Hub Precinct:** contribute to multiparty science/research teams and deliver co-designed Lincoln Hub projects; enhance the Lincoln Hub precinct and ecosystem by supervising post-graduates and student internships

Additional indicators covering operational areas such as good employer, health and safety, and our environmental performance, can be found on our website:

www.landcareresearch.co.nz/about/sustainability

Indicator	Measure	2015/16 Actual	2017/18 Target
End-user collaboration	Revenue per FTE from commercial sources (\$000s) ¹	\$53	\$47
Research collaboration	Percentage of papers co-authored ¹ – total	88%	90%
	Co-authored with other New Zealand organisations	27%	25–30%
	Overseas co-authors	28%	30–35%
	Both New Zealand and overseas co-authors	32%	30–35%
Technology and knowledge transfer	Commercial reports per scientist FTE ¹	0.9	0.9
	Availability of data from our SSIF-funded databases, collections and information systems (assessed by a variety of metrics appropriate to each; metrics online)	Refer 2017 annual report	Increasing trends
	Response rate for requests to our SSIF-funded biological collections and associated infrastructure (specimen transactions, identifications, visits)	96–100% service delivery	>95%
	New and improved products, processes and services	54	55
	Presentations to stakeholders and community groups	214	250
Science quality	Impact of scientific publications (mean citation score) ¹	3.1	2.9–3.3
Financial indicator	Revenue per FTE (\$000s) ¹	\$178	\$229
Stakeholder engagement	Percentage of relevant end-users who have adopted knowledge and/or technology from Landcare Research ²	93%	>95%
	Percentage of relevant funding partners and other end-users that have a high level of confidence in our ability to set research priorities ²	71%	>75%
	Percentage of stakeholders involved in a specific research team/partnership that have a high level of confidence in our ability to form the best team for the collaboration they were involved in ²	84%	>90%
	Staff invited to participate in stakeholder meetings or workshops	252	250

Vision Mātauranga	Number of positive strategic partnerships with iwi and Māori organisations in which we are linking science and mātauranga, and which address Māori goals and aspirations	63	80
Commercialisation	Number of new and existing licensing deals of Landcare Research-derived IP (including technologies, products and services)	8	8–14
High-performance culture	Staff engagement in survey evaluations Staff retention rate	63% 92%	>70% >90%

¹ Generic indicators as required by MBIE across all CRIs are at the Landcare Research Group level; the rest are at Parent level

² Data provided from the MBIE-commissioned biennial external client survey

Financial Performance

Financial performance and position

The five-year financial plan reflects a step change in activity during 2017 and 2018 following the successful MBIE Endeavour funding in 2016 and Landcare Research's leadership of the Biological Heritage NSC. This is followed in the out years by modest but steady revenue growth with a continued focus on productivity and efficiency gains.

For the year ending 30 June:	2017		2018		2019		2020		2021		2022	
	Target	Forecast	Target	Target	Target	Target	Target	Target	Target	Target	Target	
Revenue	61.9	64.6	78.9	79.1	80.2	82.2	83.9					
EBIT ¹	1.3	1.9	2.9	2.7	3.0	2.9	3.2					
Total assets	53.8	61.7	68.3	67.6	68.6	73.7	76.8					
Capital expenditure	7.8	5.8	12.4	12.8	6.3	10.7	10.9					
Dividend	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Equity ratio ²	62%	60%	56%	57%	60%	61%	60%					
Gearing ³	0%	0%	0%	0%	0%	0%	0%					

Explanatory notes to table:

¹ EBIT: earnings before interest, financial lease charges and tax, and after committed business development expenditure and technology service expenditure

² Equity ratio: average shareholders' funds ÷ average total assets

³ Gearing: interest-bearing debt ÷ interest bearing debt + shareholders' funds, expressed as a percentage

In 2018 Landcare Research revenue is budgeted at \$78.9million, up by \$14.3 million compared with the 2017 forecast. Biological Heritage NSC and MBIE research involves considerable revenue subcontracted to partner organisations, so the underlying net revenue increase for Landcare Research in 2018 is \$7.8 million.

Tailored return on equity

Landcare Research must continue to be flexible in responding to changes in the external environment and pursuing strategic opportunities. In determining a tailored rate of return to shareholders, we use the following principles.

- The rate of return on equity (RoE) needs to ensure the financial sustainability of the organisation.
- The Board proposes a lower tailored RoE so that it can support the databases and collections and strategic investments, which will enhance science, provide benefit to New Zealand and underpin future value.
- The targeted RoE will be reviewed by the Board over the planning period as other strategic investment opportunities with long-term benefits are presented.

Landcare Research's tailored RoE in 2018 is 7.8%. The tailored RoE recognises continued reinvestment of surpluses in strategic investment opportunities will create long-term benefits. We intend to reinvest surpluses with an EBIT impact of \$0.7 million each year.

Balance sheet

Landcare Research's science requires an ongoing investment in scientific equipment if we are to secure revenue and be financially sustainable. Beyond this underlying capital spending requirement, the priority for 2017 and 2018 is to redevelop aspects of the Lincoln site consistent with the concept of the Lincoln Hub Precinct and to provide modern fit-for-purpose facilities for our people.

Cashflow and dividend

Landcare Research expects to continue to deliver steady operating cash flows, with an EBITDAF of \$6.2 million in 2018, which is forecast to remain at similar levels through the five years of this SCI, with a predicted EBITDAF of \$9.2 million in 2022.

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

Risks

There is forecasting uncertainty associated with Landcare Research revenue budgets. There are risks and opportunities for competition and disruptive technologies with the potential to impact capability and future business sustainability. Landcare Research is confident its plans remain robust and we will actively monitor and respond to any emerging risks.



Jane Taylor
Chairman



Dr Paul Reynolds
Deputy Chair

30 June 2017

Appendices

Appendix 1: Additional financial indicators

	2018	2019	2020	2021	2022
Operating margin ¹	7.9%	8.6%	10.1%	10.8%	11.0%
Profit/FTE	\$18,116	\$19,789	\$23,529	\$25,829	\$26,785
Quick ratio ²	1.60	1.05	1.04	1.05	0.92
Interest coverage ³	N/A	N/A	N/A	N/A	N/A
Profit volatility ⁴	8.8%	6.9%	12.3%	17.5%	16.5%
Forecasting risk ⁵	1.6%	1.0%	0.9%	0.5%	0.2%
RoE before investment	7.8%	6.7%	6.8%	6.3%	6.5%
RoE NPAT ⁶	6.5%	5.4%	5.6%	5.2%	5.4%
Revenue growth	22.2%	0.2%	1.4%	2.5%	2.1%
Capital renewal ⁷	3.7	3.1	1.2	1.8	1.8

Explanatory notes to table:

¹ Operating margin: EBITDAF ÷ revenue, expressed as a percentage and per FTE (EBITDAF is earnings before income tax before depreciation, amortisation and fair value adjustments)

² Quick ratio: (current assets – inventory – prepayments) ÷ (current liabilities – revenue in advance)

³ Interest cover: EBITDAF ÷ interest paid

⁴ Profit volatility: The standard deviation of the past five year's profit, scaled by average profit.

⁵ Forecasting risk: 5-year average of return on equity, less forecast return on equity

⁶ Return on equity: NPAT ÷ average shareholders' funds, expressed as a percentage (NPAT is net profit after tax). Shareholders' funds include share capital and retained earnings.

⁷ Capital renewal: capital expenditure ÷ depreciation expense plus amortisation expense

Appendix 2: Nationally significant collections, databases and information systems

New Zealand Arthropod Collection (NZAC)

- The largest collection of New Zealand land invertebrates (insects and related arthropods), with >7 million specimens. Earliest collections date from the 1880s. Many specimens from the South Pacific.
- Contains over 1 million pinned specimens and approximately 6 million stored in ethanol; over 2,500 primary type specimens.
- Includes the National Nematode Collection of New Zealand (NNCNZ).
- Online via the New Zealand Land Invertebrates website, a searchable online information system.
- A key part of New Zealand's biosecurity system for the forestry, conservation, horticultural and agricultural sectors.

<http://nzac.landcareresearch.co.nz/>

<http://fnz.landcareresearch.co.nz/>

<http://www.landcareresearch.co.nz/resources/collections/nncnz/>

<http://nzinverts.landcareresearch.co.nz/>

<http://scd.landcareresearch.co.nz/>

International Collection of Microorganisms from Plants (ICMP)

- Living cultures of more than 20,000 strains of bacteria and fungi from plants and soil.
- All information fully searchable online.
- One of three major international collections for plant and soil bacteria.
- A key part of New Zealand's biosecurity system for the forestry, conservation, horticultural and agricultural sectors.

<http://www.landcareresearch.co.nz/icmp/>;

<http://scd.landcareresearch.co.nz/>;

<http://nzfungi2.landcareresearch.co.nz>

Allan Herbarium (CHR)

- New Zealand's national herbarium with >640,000 specimens of New Zealand and South Pacific algae, lichens, liverworts, mosses, ferns and seed plants collected in New Zealand. (The oldest samples were collected during Captain Cook's first voyage to New Zealand, 1769–1770.)
- Online access via the Systematics Collection Data website.
- A key part of New Zealand's biodiversity and biosecurity systems, of benefit to both conservation and productive sectors.

www.landcareresearch.co.nz/allanherbarium/;

<http://nzflora.landcareresearch.co.nz/>;

www.landcareresearch.co.nz/floras_guides/;

www.nzherbaria.org.nz/;

<http://scd.landcareresearch.co.nz>

National New Zealand Flax Collection

- A living collection at Lincoln of over 160 provenances of *Phormium* species of cultural, economic and historical interest. It supports research on both traditional and new uses of *Phormium*.

www.landcareresearch.co.nz/harakeke

Land Resource Information System (LRIS), including New Zealand Land Resource Inventory (NZLRI) and Land Cover Database (LCDB)

- A national database which depicts general land characteristics (rock, soil, slope, erosion and vegetation), a derivative general-purpose land evaluation (land-use capability), and a range of environmental, climatic, management and production attributes.

www.landcareresearch.co.nz/resources/data/lris/;

<https://lris.scinfo.org.nz/>;

<https://lris.scinfo.org.nz/layer/412-lcdb-v40-deprecated/>

New Zealand Fungarium (PDD)

- The primary source of information on New Zealand and Pacific fungi, with all data fully searchable online.
- Contains 100 000 dried fungal specimens, including 2,000 type collections of New Zealand fungi.
- Contains voucher specimens documenting most plant diseases recorded in New Zealand.
- A key part of New Zealand's biosecurity system for the forestry, conservation, horticultural and agricultural sectors.

<http://www.landcareresearch.co.nz/pdd/>;

<http://scd.landcareresearch.co.nz/>;

<http://nzfungi2.landcareresearch.co.nz/>;

<http://virtualmycota.landcareresearch.co.nz/>;

<http://fungalguides.landcareresearch.co.nz>

National Vegetation Survey (NVS)

- The national repository for plot-based vegetation survey data collected, with over 60 years of data.
- A physical archive and databank of records from >103 000 survey plots including >21 000 permanent plots.
- Broad geographic coverage, from Northland to Stewart Island, the Kermadec and Chatham Islands.
- Broad ecosystem coverage from coastal to forests to high alpine.
- Survey data can be deposited with NVS for management and is also available by request.
- A key part of New Zealand's biodiversity & biosecurity information infrastructure.

<http://nvs.landcareresearch.co.nz/>

Ngā Tipu Whakaoranga – Māori plant use database

- Online access to >2,050 records on Māori names and cultural uses of New Zealand native plants, fungi and algae.

<http://maoriplantuse.landcareresearch.co.nz/>

National Soils Database (NSD)

- A 'point' database containing descriptions of approximately 1,500 New Zealand soil profiles, together with analytical data on their chemical, physical, and mineralogical characteristics.

Information is obtained from physically sampling and observing the soil on site. Soil samples are retained as a reference collection.

Appendix 3: Business Policies

We operate in accordance with the purpose and principles as stated in the Crown Research Institutes Act 1992 and have statutory obligations under other acts, including the Companies Act 1993 and Crown Entities Act 2004. Our business policies include the following.

Dividend policy

The Board will notify the shareholding Ministers within three months of the end of each financial year of the:

- amount of dividend (if any) recommended to be distributed to the shareholders
- percentage of tax-paid profits the dividend represents
- rationale and analysis used to determine the amount of dividend.

In determining the amount of surplus funds, consideration will be given to:

- shareholder policies on dividends and capital structure
- providing for strategic and capital investment requirements (including equity investments) without recourse to the Crown for equity injections to the company
- working capital requirements (including subsidiaries/businesses in which equity is held)
- the ongoing financial viability of the company, including its ability to repay debt
- the extent of debt financing in relation to the prudent borrowing capacity of the company
- obligations of the Directors under the Companies Act 1993 and other statutory requirements.

With the projected profitability and capital requirements of the organisation in the course of this planning period, we are not projecting to pay dividends to the shareholder.

Risk policy

Landcare Research has risk management and compliance processes in place and operating effectively across the agency. The risk management framework identifies, classifies, reports on and mitigates business risk. Risk reporting to the Audit and Risk Committee and the Board is done every six months, or as a risk arises.

Accounting policies

A summary of our accounting policies is included in our Annual Report. The current Annual Report can be found on our website: <http://www.landcareresearch.co.nz/about/sustainability/annual-reports/>

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 \$10 million 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 million or 30% of the Company's total assets (prior to the transaction) involving:

- acquisition, disposal or modification of an interest in a joint venture, partnership or similar association
- acquisition or disposal, in full or in part, of shares or interests in a subsidiary, external company or business unit
- transactions that affect the Company's ownership of a subsidiary or a subsidiary's ownership of another entity
- other transactions that fall outside the scope of the definition of the company's core business or that may have a material effect on the company's science capabilities
- intellectual property transactions, wherever possible in advance, will be notified in the quarterly reports to shareholding Ministers.

Appendix 4: Other Matters Required by the Crown Research Institutes Act 1992

Activities where shareholder compensation is required

Where the Government wishes Landcare Research to undertake activities or assume obligations that will result in a reduction of the organisation's profit, or net worth in terms of investment in research, the Board will seek compensation sufficient to allow the organisation's position to be restored.

No requests for compensation are currently under consideration.

Other matters specifically requested by the shareholder

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

The Landcare Research Board is satisfied that the net asset position (or total equity) is a reasonable proxy for the commercial value of the Group. The net asset position as shown in accordance with the company's accounting policies for 30 June 2016 was \$33.7 million.

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Guide to Acronyms and Abbreviations

ACC	Accident Compensation Corporation	www.acc.co.nz
Biological Heritage NSC	Biological Heritage National Science Challenge	www.biologicalheritage.nz
DOC	Department of Conservation	www.doc.govt.nz
EBITDAF	Earnings before income tax before depreciation, amortisation and fair value adjustments	
FOMA	Federation of Māori Authorities (Me Uru Kahikatea)	www.foma.org.nz
KPI	key performance indicators	
LINZ	Land Information New Zealand	www.linz.govt.nz
MBIE	Ministry of Business, Innovation and Employment	www.mbie.govt.nz
MfE	Ministry for the Environment	www.mfe.govt.nz
MPI	Ministry for Primary Industries	www.mpi.govt.nz
Natural resources sector (NRS)	Comprises the core government agencies responsible for the management and stewardship of New Zealand's natural resources; regional councils are stakeholders	http://nrs.mfe.govt.nz
NPAT	Net profit after tax	
NSSI	National Statement of Science Investment	www.mbie.govt.nz
OLWNSC	Our Land and Water National Science Challenge	www.ourlandandwater.nz
OSPRI	Operational Solutions for Primary Industries (TBfree New Zealand Ltd and NAIT Ltd are wholly owned subsidiaries)	www.ospri.co.nz
RMA	Resource Management Act	www.mfe.govt.nz/rma
RSNZ	Royal Society of New Zealand	www.royalsociety.org.nz
SCI	Statement of Corporate Intent	
SCP	Statement of Core Purpose	www.landcareresearch.co.nz
SSIF	Strategic Science Investment Fund (MBIE)	www.mbie.govt.nz
TPK	Te Puni Kōkiri	www.tpk.govt.nz