STATEMENT OF CORPORATE INTENT 2015-20

Landcare Research
Manaaki Whenua

The cover design is a stylised representation of tāniko weaving patterns, particularly as used in tukutuku panels.

Tāniko describes the traditional triangles, diamonds, diagonal bars and stepped patterns that Māori weavers use. Tukutuku are used mainly to adorn the inside walls of wharenui (meeting houses). While a tukutuku may look simplistic, they actually represent a complex language of visual symbols that tell a story.

As a tukutuku for Landcare Research – Manaaki Whenua, the multi-layered pattern symbolises:

- The diversity and complexity of environments in which we work across New Zealand
- Patterns in the landscape at national and local levels
- The piecing together of research disciplines
- Our relationships with Māori and respect for the Treaty of Waitangi

The design also reflects our increasing work in digital mapping of soils and landscapes, with specific reference to the remote sensing work to identify paddock boundaries and paddock use across landscapes and time.

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Statement of Corporate Intent 2015–2020
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Landcare Research's Core Purpose

Landcare Research's Core Purpose[1] is to drive innovation in New Zealand's management of terrestrial biodiversity and land resources in order to both 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, and Māori organisations.

Our scope of operation

Landcare Research is recognised as the lead 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 the following:

- Biosecurity, land, soil and freshwater management
- Climate change adaptation and mitigation
- Industry and business environmental performance including verification
- Indigenous forestry
- Urban environments
- Antarctica

[1] Landcare Research's Statement of Core Purpose, National Outcomes and scope of operation were agreed with stakeholders, including our shareholding Ministers, in 2010

Chair & Chief Executive's Overview

We are pleased to present Landcare Research's Statement of Corporate Intent (SCI) for the period 2015 – 19. This sets out how we will meet our shareholders' and stakeholders' expectations for our contribution to valuable outcomes for our nation's natural assets, society and economy.

Strategy refreshed to meet our operating environment

In 2014 we recognised four major shifts in our operating environment:

- The Natural Resources Sector's implementation of central and local government policies with respect to regional growth, managing natural assets (especially freshwater) and reporting on the state of the environment
- The increase in Māori sector planning for the strategic use of their natural assets, which requires understanding of land use capability and suitable governance processes
- The Primary (agricultural) Sector's efforts to address risks and opportunities for their businesses around operating within environmental limits and retaining social licence to operate, both in local communities and markets
- The re-organisation of the science sector to create new, formal partnerships in National Science Challenges and regional hubs; and also the MBIE review of Contestable and Core funding

To meet these shifts in our operating environment, we refreshed our corporate strategy to address five elements of our performance:

- Increasing our market responsiveness to the needs in our major 'user' sectors
- Enhancing the value of our science to those who use it, including the science sector
- Shifting the scope of our capabilities in research, science and technology to enable us to deliver on the first two bullet points
- Driving a high performance culture, including a focus on leadership, values, communication and financial resilience
- Leveraging our assets, including partnerships, global links and national databases and collections, to maximise our contribution to national outcomes

This SCI elaborates on the above elements of our strategic refresh. It also provides a financial plan and sets out key performance indicators for our major science deliverables. In so doing, the SCI provides two key links to our Statement of Core Purpose (page 2). The first is our connection to the users of our science, through whom the four National Outcomes are achieved. The second is how we conduct our work and ensure our capabilities are fit for purpose. A diagram of how these elements link together is provided on page 8.

An action arising from the Four-year Rolling Review of Landcare Research, an independent review commissioned by MBIE in 2014, was to reconsider the scope of our Statement of Core Purpose. Subsequent discussion with MBIE officials led us to conclude that, because the CRIs' Statements of Core Purpose were meant as enduring documents (*circa* 10 years), any change should focus on the relative weighting of the elements of the Statement of Core Purpose. Imminent changes resulting from the current reviews of the National Statement of Science Investment and Contestable and Core funding by MBIE will be material to our review of the Statement of Core Purpose. Therefore this SCI is based upon the original Statement of Core Purpose, established in 2010, but reflects weighting to achieve strong alignment with target sector needs.

Plans are now well advanced for New Zealand's Biological Heritage National Science Challenge (BioHeritage Challenge), with a secretariat based at our Lincoln site and the first projects established. We are working with our partners in the Lincoln Hub to develop coordinated research opportunities and finalise infrastructure development plans.

Core funding

Landcare Research receives $24million of Core funding from MBIE each year and invests it in basic and applied research, science capability, national and international collaboration and science infrastructure (specifically Nationally Significant Databases and Collections). Core funding has enabled us to build, with confidence and speed, science capability in areas of national need, including the land-water interface science, resource economics, Māori science and biological and spatial information technologies. Without the Core funding, developing capability would have been a slow and uncertain process through contestable bidding.

Our science users have also benefited from being able to align their funding with our Core funding and hence boost practical outcomes. Such alignment has been achieved expeditiously as, for example, in developing and implementing techniques to identify invasive pests that threatened New Zealand's agricultural base.

Integrating themes

In line with the strategic refresh, Landcare Research will focus on several integrating themes as we adapt to the changing operating environment:

Integrating science

Landcare Research is distinctive in its ability to integrate science across spatial scales (local to global), timeframes (distant past to future), disciplines (environmental, social and economic) and user groups (public and private sectors, Māori and the community). Such integration reflects the modern challenges of environmental policy, resource management and corporate responsibility. Several of our projects in 2015/16 focus on what can be achieved through integrating science.

Integrating mātauranga

For more than 20 years, Landcare Research has worked closely with iwi and hapū in addressing environmental matters of significance to Māori. Increasingly our aspiration has been to integrate science and mātauranga to achieve a richer, shared understanding of mankind's relationship with the natural environment. In 2015/16 we will benefit from increasing our capability in this area during the current year, including a new Tier 2 role.

Integrating users

New models of integration are being developed in the National Science Challenges, regional hubs and in some philanthropic investments, for example in pest management projects. Landcare Research is committed to its leadership role in achieving gains for New Zealand from these models. In 2015/16 we will implement co-location and co-creation with science users and providers through the BioHeritage Challenge that we host through the Lincoln Hub, and by engaging the public in our science (e.g. citizen science).

Integrating technologies

Rapid technology developments at both ends of the spectrum from small-scale (DNA) to large-scale (remote sensing image analyses) are highly relevant to Landcare Research. We are committed to conducting basic research that underpins application of these technologies for organisations wanting to benefit from them. Through such developments we will also seek a step change in the scale, accuracy and cost-effectiveness of our research to benefit users. Projects in 2015/16 include new DNA technologies for rapid identification of invasive species and also new technologies for gathering and analysing remotely sensed land information.

Our Strategic Focus

The value of our science

Complex challenges face New Zealanders in managing our natural resources sustainably. We have developed a framework to assess the internal and external value of our research, to understand how we can more effectively respond to this complexity, and increase the impact of our work. The framework provides a means of learning from our own experience and identifying how to best meet the needs of stakeholders, with a view to applying key learnings across all of our research activity. We expect this process to influence the scope of our research, and how we undertake it, as well as the ways in which we engage with our clients and other stakeholders.

As part of the value framework, we are developing a series of case studies with stakeholders in the Māori, Primary Industry and Natural Resource Sectors. The cases studies will identify how our science has added value, and where we could increase the value of our work to support more effective environmental stewardship and sustainable resource management in New Zealand.

In particular, we have identified a growing demand for fully-integrated, applied research programmes spanning the environmental, social, economic and cultural elements of natural resource management. Part of our planned work this year will be to strengthen internal practices and culture to support the delivery of more integrated research.

We have also identified a set of national priorities to which Landcare Research can add particular value through its research leadership, science excellence and expertise in delivering integrated research (*see sections below*).

Enhancing environmental information

Demand is increasing for readily available, high-quality environmental information. New Zealanders who manage natural resources and environmental policy and regulatory agencies need accurate information about our environment, how it is changing and the pressures on it.

The growing need for evidence-based information reflects a shift in the resource management system to set 'hard' environmental limits. New Zealanders also need accessible information to participate in an informed debate about balancing environmental goals with social, cultural and economic aspirations.

Landcare Research has a strong track record in providing environmental information to underpin the development of policies, plans and regulations, and to support land management decisions. We have played a very significant role in developing comprehensive biodiversity monitoring systems and fundamental information on New Zealand's land resources. We are also the custodian for S-map, the new national soils database, which provides key information (including services online) to manage land-use effects on water quality.

In the coming year, we will continue to deliver data, analysis and advice for policy, regulation and natural resource management in line with the Environmental Reporting Bill. We have worked closely with the Ministry for the Environment and Statistics NZ to support the development of a national Environmental Reporting Framework and the third National State of the Environment Report – Environment Aotearoa 2015. Some of our senior staff have governance, advisory and technical leadership roles in this, including through secondments into the Ministry. We will work closely with councils and central government agencies to develop indicators for pests, weeds, land, soils, biodiversity and cultural values, and help deliver online environmental information to the public via the national 'Land, Air, Water Aotearoa' (LAWA) portal.

Improving freshwater management

New Zealand is currently undertaking wide-ranging reforms to how fresh water is managed. The reforms aim to address the deteriorating water quality and water demand outstripping supply in some areas, balance different interests and values in water, and deliver robust information on the pressures on water. Increasingly, the reforms are focused on managing the effects of land-based activities on water.

Landcare Research has significant expertise in improving water outcomes, including national leadership in soils and landscapes, sediment and erosion, integrated catchment management, wetlands, modelling the economic and environmental impacts of policies, knowledge of mātauranga Māori and cultural values, and sustainable land management practices. We lead a national research programme to help councils and communities use collaborative processes to set objectives and limits for water, in line with the National Objectives Framework.

We also offer niche expertise to support irrigation development through our soil moisture sensing and mapping technology, spatial modelling of environmental and economic effects of irrigation schemes, and working with others to model the impacts of different irrigation water allocations on reliability of supply, leaching and profit. In the coming year, we will build on this work, increasing our focus on the primary sector, and continue to provide science advice to the recently reconvened Land and Water Forum.

Sustainable primary sector growth

As noted earlier, our work has long supported councils and government agencies to set land-based policies and regulation in support of sustainable environmental management in New Zealand. However, the same research expertise that helps set policies and regulation is increasingly relevant to private sector interests wishing to manage their land-based activities within regulatory limits, or to meet market and community expectations of sound environmental practices.

We are increasingly bringing our expertise to bear in support of the primary sector, Māori and the irrigation sector, as highlighted above, and will continue to build partnerships in the coming year with key sector organisations to deliver value to the primary sector and explore joint initiatives. In particular, we will be looking to transfer benefit and value from our expertise in soils, sustainable land management and biodiversity to the primary sector. Riparian management, native species and biodiversity restoration, resilience to climate, social surveying, and soil mapping and erosion management are all specific areas in which we will be looking to offer expertise. To this we can add the expertise of Enviro-Mark Solutions, our subsidiary, which specialises in carbon and environmental management certification services for private sector clients.

In the coming year, we will continue to strengthen relationships with key primary sector partners such as the Federated Farmers, Fonterra, Beef + Lamb New Zealand, and other primary sector organisations who are working with their members to achieve more sustainable land-based production. We recently invited Federated Farmers onto our Outcome Advisory Panel that helps us set our strategic priorities.

Developing Māori land

Landcare Research has had a long association with the Māori sector through our relationships with iwi and hapū. Our integration of ecological, cultural and economic research combined with the long-term sustainable development ethos of our work, mean that our research is well aligned to the intergenerational and holistic worldview of Māori.

A 2013 MPI report 'Growing the Productive Base of Māori Freehold Land' estimates c. 1M hectares 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. In the coming year, we will continue to work closely with organisations such as MBIE, TPK, 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 such as WhenuaViz. We will also focus on knowledge transfer to Māori collectives and agri-businesses, particularly in regard to sustainable land management and governance. Landcare Research is one of only a

small number of providers selected to deliver training and advice through MBIE's Māori Innovation Fund in support of the 'He Kai Kei Aku Ringa' Action Plan.

Increasingly, we are working with Natural Resources Sector agencies such as the Ministry for Primary Industries to identify how we can support regional development initiatives, many of which add momentum to natural asset development by Māori interests.

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 weeds, pests and diseases. The BioHeritage Challenge mission 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. Citizen science initiatives are planned to be part of the Challenge, and are likely to boost public engagement with, and awareness of, the value of the Challenge.

Landcare Research is the host for the BioHeritage Challenge, one of the first two of ten National Science Challenges to become fully operational. We are contractually responsible to MBIE for delivery of the Challenge work programme. Over $25 million has been committed to the Challenge over the first five years, with further funding aligned from Challenge partners. Landcare Research leads two of the three Challenge research programmes and provides operational support to the Challenge governance and management.

Seventeen parties are collaborating in the BioHeritage Challenge – the most of any Challenge. The parties span the research community, government agencies, business, Māori and the public. A Challenge Parties Group, Kāhui Māori and a Stakeholder Advisory Group provide advice to the Challenge on strategic direction, Vision Mātauranga and user priorities.

We are pleased with progress and collaboration in the start-up phase of the Challenge. A set of initial projects will soon lead off a 4-year phase of research. The focus for next year is to expand the number of projects supported by the Challenge, increase engagement with stakeholders, and bed in administrative arrangements.

www.biologicalheritage.nz

The Lincoln Hub

The Lincoln Hub can unlock much potential innovation and build essential capability across land-based sectors through collaborative research, education and industry development activities. Key partners are AgResearch, Landcare Research, Plant & Food Research, Lincoln University and DairyNZ. Teams will work together on priority areas, sharing facilities across organisations. Landcare Research will bring significant resources to the Centre, both from its Lincoln-based facilities and its national network. We look forward to contributing expertise in spatial soil and land-use information, nutrient and water management and greenhouse gas mitigation, biodiversity and biosecurity risk management, policy support, economic and social dimensions including Māori traditional knowledge and community engagement.

We are working on plans that will stimulate innovation and entrepreneurial endeavour and support for industries in the region. The Lincoln Hub will facilitate stakeholder and research collaboration and networking opportunities, provide work-ready graduates for the land-based sectors and transfer knowledge and technology to end users.

Our National Outcomes & Impacts

Landcare Research contributes to a set of four National Outcomes, defined in our Statement of Core Purpose. We have a direct role in achieving a set of eight intermediate Impacts (see figure previous page). In addition to improving the natural environment, Landcare Research often works where the economy intersects with the environment, thereby ensuring sectors have a social licence to operate. A key part of our role is to enable others in the Natural Resources Sector, primary industries and business, Māori sector, and communities to make better decisions on natural resource conservation, management and sustainable use.

To facilitate this, Landcare Research must maintain and build enduring relationships with the sectors. 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 twice yearly and provides high-level strategic advice to our Board of Directors. In addition, the National Science Challenges and regional hubs have entailed much wider collaborations with stakeholders and other research providers.

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 – both clients and collaborators – and maintain and develop critical research and other infrastructure.

Underpinning a significant part of our work is a wide range of environmental information, data and expert knowledge. Much of this has been funded for the public good, and we are committed to improving our data and its management and increasing public access to it. We do so through enhanced digitisation of our collections and associated information, and the development of our databases and web portals. In addition, we target our technical and knowledge transfer activities to areas of critical national importance.

As well as activities focused on driving uptake of research by public sector and industry end users, we have a strong focus on sharing research with the general public through:

- General media and sector media articles and publications
- RadioNZ science programmes and other radio interviews
- Social media (Facebook, Twitter, YouTube, Scoop.It)
- Public events such as BioBlitz
    - Provision of information through the National Land Resource Centre and the Nature Services web portals (www.nlrc.org.nz and http://natureservices.landcareresearch.co.nz/app/)
- Mentoring students in school science fairs
- School talks, educational resources on our website and hosting teachers on RSNZ Fellowships

Focus in 2015/16

The next sections provide more information on how we intend to support the National Outcomes and Impacts, particularly in the coming year. We cover our planned allocation of Core funding to Outcomes and Impacts and highlight the key research initiatives, as well as major knowledge and technology transfer initiatives to facilitate adoption and use of our research outputs by key users.

As part of our performance monitoring framework, we regularly assess and report on progress against our planned activities, including via quarterly reports to MBIE and our annual report.

National Outcome 1: Improve measurement, management and protection of New Zealand's terrestrial biodiversity, including in the conservation estate

***Key Performance Indicator**: The status and trend in national and regional biodiversity show an improvement in biodiversity in some environments, and a halt in the decline of representative examples of all others.*

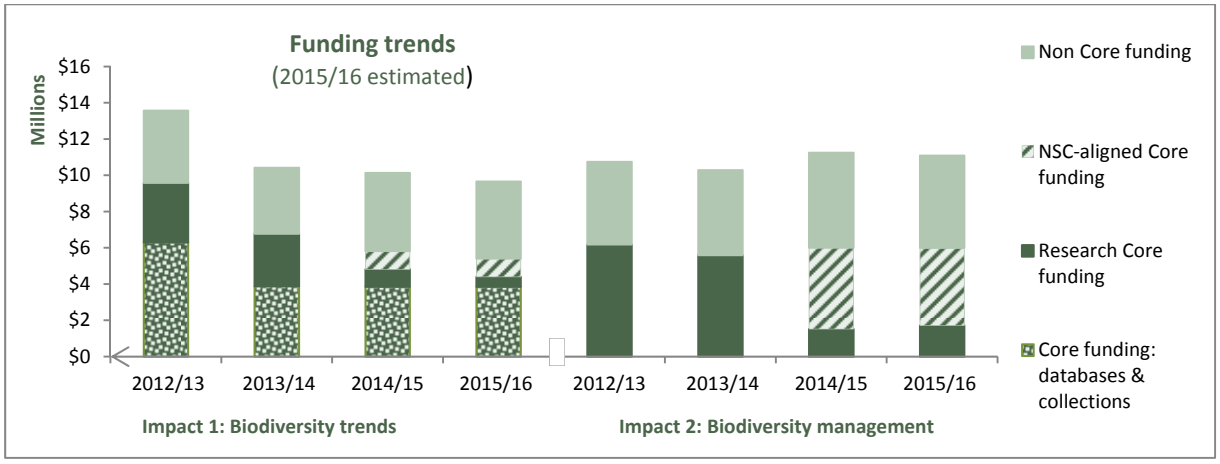
Background

The integrity of New Zealand's iconic natural heritage is central to our identity, lifestyle and economy. Intergenerational responsibility for the management of indigenous ecosystems, expressed through kaitiakitanga, is also central to Māori aspirations.

Much of our biodiversity is outside protected areas, and is under increasing threat from invasive species, climate change, agricultural intensification, and land conversion to plantation forestry, mining and urban development.

We work with DOC, regional councils, wildlife sanctuaries, non-governmental and community groups to deliver this Outcome for New Zealand, as well as contributing through major national initiatives such as the BioHeritage Challenge, Better Border Biosecurity and Predator Free New Zealand.

Outcome 1 Core funding



2015/16 non-Core funding for Impacts 1 and 2 excludes the BioHeritage Challenge funds dispersed to other organisations

The relatively large allocation of Core funding to Outcome 1 reflects Landcare Research's national leadership in public-good biodiversity research, as well as our custodianship of several Nationally Significant Databases and Collections (Appendix 1), which are critical to Impact 1 and also support Impact 2.

In 2013/14, some Outcome 1 funding was realigned to Outcome 4 to better support New Zealand's biosecurity response readiness. In 2014/15, we reprioritised some resources to focus more on biodiversity management with a view to better supporting 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.

A significant proportion of our Outcome 1 Core funding will be aligned to the New Zealand's Biological Heritage National Science Challenge, given that much of our research will be critical to the Challenge achieving its mission of reversing the decline in New Zealand's biodiversity.

Core-funded collections and associated information systems supporting this work

Around a third of Landcare Research's total Core funding is allocated to the maintenance and curation of seven of New Zealand's 25 Nationally Significant Databases and Collections. These represent important national

science assets for the country. The following collections and information systems provide underpinning information for Outcome 1 activity in support of national biodiversity and biosecurity goals:

- New Zealand Arthropod Collection
- New Zealand Fungal and Plant Disease Collection
- International Collection of Micro-Organisms from Plants
- Allan Herbarium
- National New Zealand Flax Collection and Ngā Tipu Whakaoranga Database on cultural uses of plants
- National Vegetation Survey (NVS) Databank

Ongoing knowledge and technology transfer initiatives

Landcare Research undertakes a variety of activities to support ongoing knowledge and technology transfer to end users and to drive the adoption of new approaches, tools and techniques we have developed. We also engage directly with end users via various hubs and formal collaborative networks. The BioHeritage Challenge will provide related new approaches to knowledge and technology transfer activities, as well as enabling our work to have much wider uptake.

We principally focus on:

- Making authoritative information available readily available through:
    - High-profile, internationally-recognised scientific papers, authoritative online publications and newsletters targeted to specific end users. Open access to web-based environmental information resources, data portals and user-friendly online guides
    - Specialist species and biodiversity identification services and risk management advice
- Providing research expertise to:
    - The Natural Resources Sector through advisory services, contract reports and seminars.
    - National and international technical advisory groups and key user forums
    - RMA decision processes through the provision of independent, authoritative advice
    - Post-graduates and other emerging researchers, through supervision and lecturing at joint post-graduate schools and other formal research collaborations.
- Developing stakeholder capability and capacity, including:
    - Staff secondments to end user agencies and research collaborations (such as the BioHeritage Challenge)
    - Māori scientific capability by involving iwi practitioners and kaitiaki in our programmes
    - Support for the Sanctuaries of New Zealand network, Predator Free New Zealand initiative and citizen science initiatives such as the New Zealand Bio-Recording Network Trust
    - Training workshops for stakeholders, e.g. plant identification for biodiversity and biosecurity managers

Key research initiatives 2015/16

Impact 1.1: Trends in national and regional biodiversity on public and private land are known and understood, based on best available definitions and descriptions for species and indices of ecological integrity.	**Enhance the relevance, impact and use of Collections-derived knowledge through continued:** • Focus of our systematics research on species critical to national biodiversity and biosecurity goals • Development of new species identification tools for key end users • Digitisation activities and development of information systems to enable users to access species information online **Increase the use of nationally-consistent biodiversity indicators by developing and implementing:** • Indicators for private landowners to support biodiversity management in production landscapes • Ecologically and culturally meaningful indicators for biodiversity to support use of valued species by Māori • New methods to identify tipping points for ecosystems and ecosystem resilience **Pursue new techniques to develop comparable metrics to measure biodiversity by:** • Continuing to develop and implement 'next generation' biodiversity monitoring, including use of genomic techniques • Developing innovative analytical tools for environmental reporting across scales • Improving techniques to quantify and integrate uncertainty into environmental reporting indicators	**Measure of success (KPI):** DOC and regional councils are using comparable metrics to measure status and trend and impacts of interventions on biodiversity within their jurisdictions.
Impact 1.2: Frameworks are in place to ensure the most threatened ecosystems, habitats and species are managed to reduce the risk of decline in native biodiversity.	**Improve identification of the most threatened ecosystems, habitats and species by developing:** • Tools to predict where native biodiversity is under most threat • Methods to better understand ecosystem connectivity by assessing gene flow levels across habitats • Methods for more robust reporting of status and trend for threatened ecosystems **Boost protection of threatened and/or high-value ecosystems, habitats and species by continuing to:** • Evaluate and develop new restoration strategies for iconic threatened species, including in production landscapes • Develop biodiversity management plans for iwi • Develop new approaches and methods to restore the most threatened ecosystems, improve native biodiversity in urban and productive landscapes, improve the resilience of iconic native flora, fungi and fauna to critical risks and threats, and manage rare species on mixed ownership land (Crown/Māori/private) during land-use change • Refine methods and approaches to increase the success rate of weed biocontrol agents • Scale up activity to support regional pest management and optimise large-scale approaches to pest control • Improve surveillance, detection and control technologies and strategies for pest organisms	**Measures of success (KPIs):** RMA consents related to land-use change are informed by a scientifically-based set of criteria that take account of cumulative effects on habitat availability. Management decisions by DOC, MPI and regional councils, aimed at reducing threats to species and habitats, are based on robust risk models that reflect best available knowledge about the efficacy, cost and acceptability of management strategies and tools.

National Outcome 2: Achieve the sustainable use of land resources and their ecosystem services across catchments and sectors.

Key Performance Indicator: *New Zealand land use is matched within the land resource's environmental limits and key ecosystem services are maintained or enhanced.*

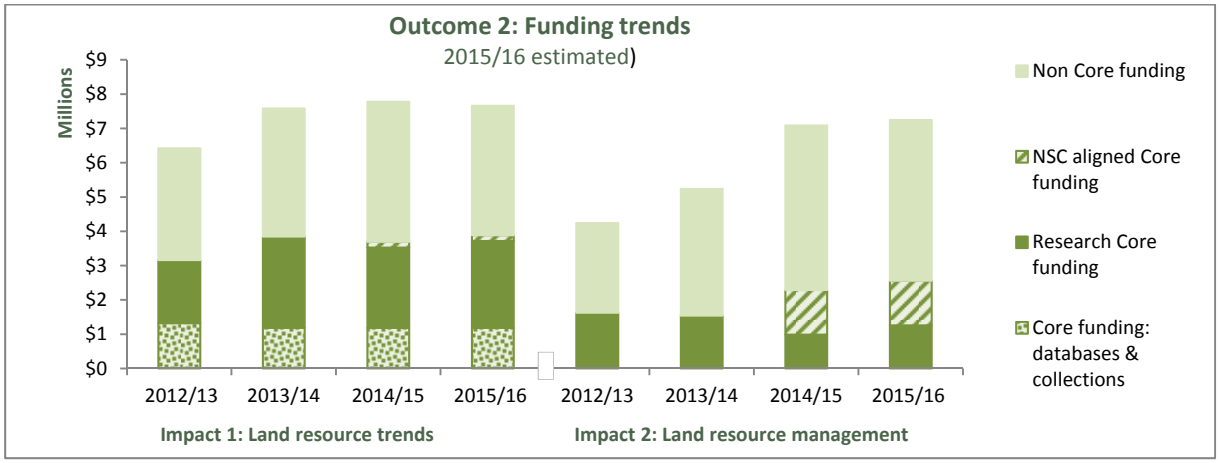
Background

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

The demand for environmental information 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.

In response, the Natural Resources Sector has prioritised improving national environmental information and initiated a major programme to fill knowledge gaps to enable policy, regulatory and operational agencies and land owners to manage land within environmental limits.

Outcome 2 Core funding



2015/16 non-Core funding for Impact 2 excludes the BioHeritage Challenge funds dispersed to other organisations

Since 2012/13, Core funding has increased to this Outcome area 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. In addition, some Core funding was realigned from Outcome 3 to this Outcome to integrate research on soil carbon and nitrogen with other soils research (previously, specifically-focused on greenhouse gas measurement).

In 2015/16, we increased funding to support remote sensing and land use research to meet demand for cost-effective, large-scale environmental information and accurate data on land use and land use impacts to support setting and meeting water quality limits as part of the water management reforms.

We expect to align some Core funding to the Our Land and Water National Science Challenge once the major research directions for the Challenge have been determined.

Core-funded 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)

Ongoing knowledge and technology transfer initiatives

Landcare Research uses a number of pathways to disseminate information on its land and soils research to key users and sectors, including in the irrigation, fertiliser, agricultural and forestry sectors, and to those national and regional policy and regulatory agencies that set frameworks for how New Zealand manages its land and water. The National Land Resource Centre (www.nlrc.org.nz), a consortium initiated and led by Landcare Research, plays a vital role in knowledge and technology transfer. Landcare Research expects to be a major contributor to the Our Land and Water National Science Challenge and the Lincoln Hub, both of which will be significant in terms of knowledge and technology transfer.

We principally focus on:

- Making key data and information readily available to end users and research collaborators through:
    - Open access to the LRIS Portal, S-map Online, and Our Environment web portals
    - The WhenuaViz information tool that supports Māori land development opportunities, and which was developed with LINZ, MPI, FOMA and Te Tumu Paeroa
    - The Sustainable Land Use Research Initiative (SLURI, www.sluri.org.nz)
    - The Integrated Research for Aquifer Protection (IRAP) programme across four CRIs, DairyNZ, Lincoln Agritech, Aqualinc and ECan, with an end user group of regional and district councils, MPI, MfE, FAR, HortNZ, Ngāi Tahu and Federated Farmers
    - Collaborative initiatives with Scion ('Growing Confidence in Forestry's Future' programme) and AgResearch ('Clean Water, Productive Land' programme)
    - Contract reports and publications
- Providing research expertise, presentations and summary information to:
    - Federated Farmers, OVERSEER®, community groups, the Fertiliser and Lime Research Council, Forest Industry Levy Trust Board, IrrigationNZ and the mining sector
    - Policymakers, regulators and land managers in government and local government
- Developing stakeholder capability and capacity, including:
    - Secondments to end user agencies (e.g., MfE) and membership of technical advisory groups and special interest groups (e.g. Land Managers Group, Land Monitoring Forum)
    - Advice and training to Māori collectives and trusts to identify profitable land use options within a kaitiakitanga framework

Key research initiatives 2015/16

Impact 2.1 The status and trends of land resources and ecosystem services (including their interactions) are known and understood.	**Improve the relevance and utility of national land and soils information by:** • Extending digital soil mapping techniques to improve coverage of hilly and complex terrain • Refining and generating new land and soils data and indicators to support national environmental reporting • Refreshing our online data portals so they provide more fit-for-purpose, user-friendly information **Enhance the accuracy and defensibility of national land and soils information by:** • Developing innovations in remote sensing, 'big data' analysis techniques and modelling to improve the accuracy of soils, land use and land cover information in New Zealand • Improving the information infrastructure for land and soils data, including developing data standards for the capture, integration, modelling and delivery of data from multiple sources	**Measure of success (KPI)** Key elements of the Land Resource Information System have been enriched and are being used under the New Zealand Government Open Access Licensing (NZGOAL) framework for web services.
Impact 2.2 Opportunities and threats to land resources and ecosystem services are recognised and balanced to maintain or enhance the provision of ecosystem services.	**Improve knowledge about the pressures on New Zealand's land resources and ecosystem services by:** • Better understanding soil C and N dynamics and leaching and microbial interactions • Better quantifying the impact of rapid expansion of irrigation and agricultural intensification on soils and ecosystems • Improving approaches to assessing erosion hazards, erosion susceptibility, and underlying land resource information **Support more sustainable land and water management practices, policy and regulation by:** • Extending coverage of S-map (New Zealand's soil map), delivering online S-map interoperability with OVERSEER®, developing online video guides and mobile apps for S-map, and applying new techniques to respond to the demand for farm-scale soil information • Developing culturally appropriate approaches and tools to support Māori agribusiness and Māori land development • Developing new approaches to manage and mitigate environmental contaminants (e.g. sediment, microbes, metals) • Assessing the benefits of diverse pasture systems by evaluating soil functions and resource-use efficiency • Refining novel soil–water devices (lysimeters, wireless sensor networks) to increase water- and energy-efficiency	**Measure of success (KPI)** Regional councils and the irrigation, pastoral and arable sectors are using knowledge of soil variability to improve the match between land use practices and land capability.

National Outcome 3: Improved measurement and mitigation of greenhouse gases from the terrestrial biosphere.

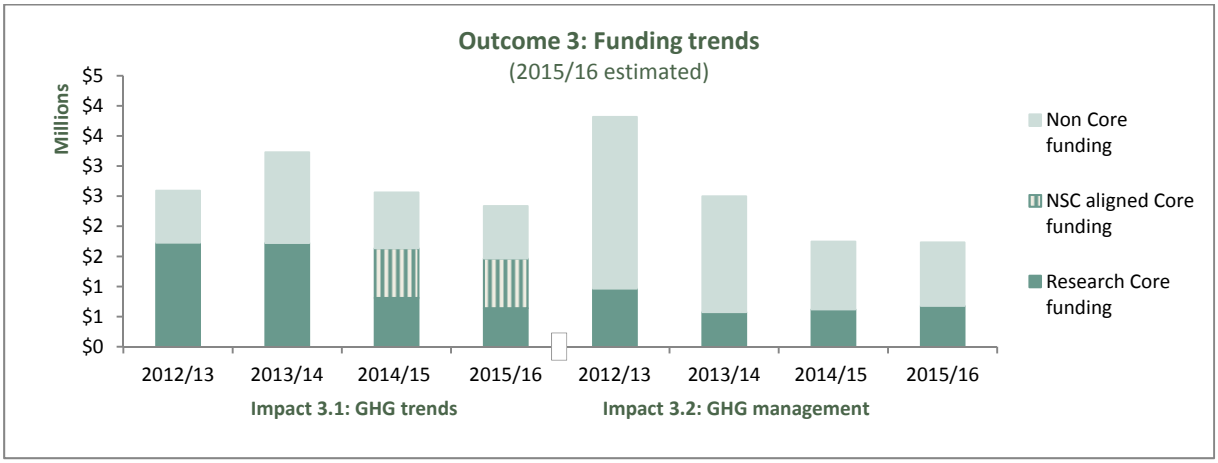
Key Performance Indicator: *New Zealand is meeting its international reporting obligations and reducing net greenhouse gas emissions from the terrestrial biosphere.*

Background

For New Zealand to meet its international greenhouse gas reporting obligations, it is necessary to have a robust inventory of net emissions and carbon storage at a national scale. As the global community, including New Zealand, considers how best to agree and set a new suite of national emissions reduction targets later this year, it will also be important for New Zealand to be able to model the environmental and economic impacts of proposed emissions reduction targets, and 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 Core funding



Some Core funding to this Outcome has been realigned to support related research in Outcomes 2 and 4 where the focus on sustainable management of productive land and soils also supports management of greenhouse gases and soil carbon.

Core-funded databases and collections and associated infrastructure:

Although no Core 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). (Refer to Appendix 1, page 29.)

Ongoing knowledge and technology transfer initiatives

In addition to scientific papers and commissioned contract reports, Landcare Research undertakes a variety of activities to support ongoing knowledge and technology transfer to end users and ensure new information and insights can be readily applied.

We principally focus on:

- Making key data and information readily available to:
    - The Intergovernmental Panel for Climate Change (IPCC) working groups and reports

- MPI, MfE, primary sector industry groups (DairyNZ, Fonterra, Synlait, Beef+Lamb New Zealand, New Zealand Forest Owners Assoc., the fertiliser industry, and the pig and poultry sectors)
- The Global Research Alliance (GRA), the Global Partnership in Livestock Emissions Research (GPLER), the New Zealand Agricultural Gases Research Centre (NZAGRC), and the New Zealand Centre for Climate Change (NZCCC)
- Collaborative researcher and end user networks – NzOnet (nitrous oxide researchers and DairyNZ), Methanet (methane researchers and DairyNZ), and CarbonNet (soil carbon researchers)

- Providing research expertise, presentations and summary information to:
    - MfE, MPI, DOC, private landowners, forestry consultants and the Carbon Farming Group on carbon sequestration rates in woody species and the impact of land use on soil carbon
    - The Natural Resources Sector on greenhouse gas models, emission factors and accounting methodologies
    - The International Energy Agency Bioenergy Task Force 38 as part of collaborative work on refining the optimal role of bioenergy for greenhouse gas mitigation

- Supporting 'future researchers' through:
    - University lecturing and supervising postgraduate students, particularly through our joint professorial role with Massey University, and hosting and mentoring post-doctoral researchers

Key research initiatives 2015/16

Impact 3.1
The status of terrestrial greenhouse gas emissions and removals are known, and changes in relation to management strategies, land use policies and global change are forecast.
	Improve national greenhouse gas inventory reporting and forecasting by:
	• Continuing to improve the accuracy of greenhouse gas emissions measurement and modelling through improved:
	  ○ Modelling of processes which result in agricultural N_2O and CH_4 emissions
	  ○ Estimation of soil and above-ground carbon emissions and removals
	  ○ Quantification of emissions of N_2O and soil C changes in hill-country pasture to account for differences in emission factors and nutrient transfer between slope classes
	• More accurate scaling-up and spatial mapping of emissions and removals, and new technologies and methods (e.g. Vis-NIR spectroscopy, automated soil core scanning, gamma soil surveys), to deliver more accurate emissions and removals data
	• Developing farm-scale greenhouse gas assessment tools for potential use in the Emissions Trading Scheme
	Support consideration of future national emissions reduction targets by:
	• Developing more accurate assessment of on-farm greenhouse gas emissions and removals, and methods and technical expertise to support on-farm soil C auditing
	• Continuing to provide advice on national assessments of soil C stocks, biomass in natural forests and scrubland and C sequestration rates for the Emissions Trading Scheme, and accounting methods for forest disturbance
	• Contributing to international activities and projects to improve greenhouse gas accounting methods
		Measure of success (KPI):
		MPI and MfE are using verified estimates of greenhouse gas emissions and carbon storage to reduce uncertainty in national inventories.

Impact 3.2 Land use options, asset management and other methods that increase carbon storage and mitigate greenhouse gas emissions are understood and balanced for environmental, economic and social benefits	**Reduce the greenhouse gas impacts of land management practices by:** • Continuing to provide evaluation of the impact of mitigation options on emissions and removals • Measuring and modelling the potential for pasture systems to optimise soil C storage, and continuing whole ecosystem modelling of the C cycle **Assist land-managers to adapt to a changing climate by:** • Continuing to target research on understanding key system responses to aspects of climate change (e.g. plant growth response to CO_2)	**Measure of success (KPI):** Validated methodologies and land use practices to mitigate greenhouse gas emissions and increase carbon storage and adapt to likely climate change effects.

National Outcome 4: Increase the ability of New Zealand industries and organisations to develop within environmental limits and meet market and community requirements.

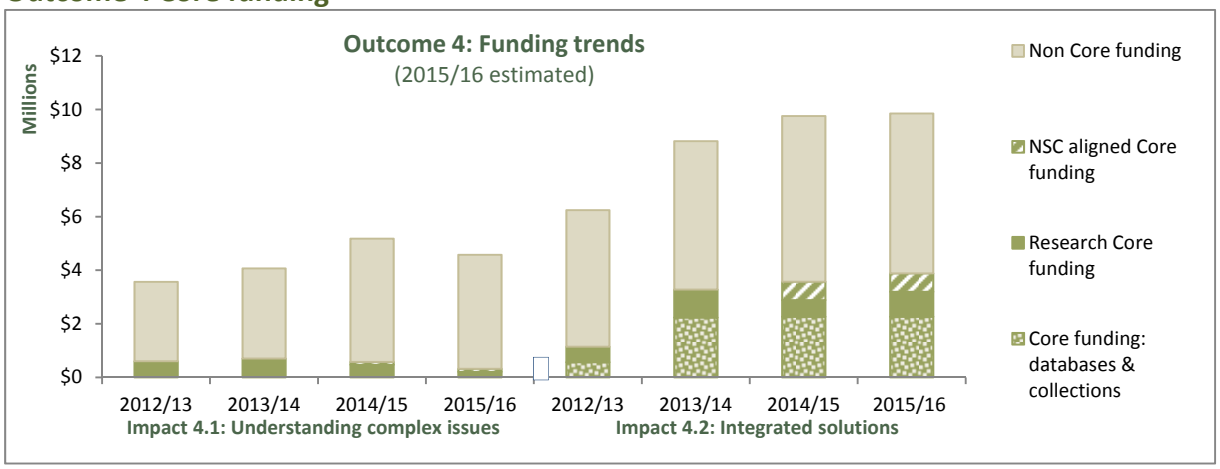
Key Performance Indicator: *Integrated solutions add value in industry, international markets; meet and demonstrate compliance with regulatory and market requirements; reduce costs of production; and provide measurable benefits to local communities*

Background

New Zealand's prosperity is heavily dependent on our environment. The prominence in our economy of primary sector production, tourism and niche sectors reliant on our landscapes (e.g. the film sector) highlight that, long term, New Zealand's economic development can only be sustained by industries and sectors 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.

Our research supports agencies tasked with developing and implementing effective environmental policy, regulation and practices for the sustainable management of land, water and ecosystem services. Our work also supports MPI and the operational agencies tasked with managing biosecurity issues, and DOC, regional councils and land managers responsible for weed and pest management. Research aligned to the BioHeritage Challenge will focus on high-tech, next generation solutions to invasive small mammal surveillance and control. As the Predator Free New Zealand initiative gains profile, there is growing interest in the potentially significant contribution of citizen science projects, particularly at the landscape scale.

Outcome 4 Core funding



2015/16 non-Core funding for Impact 2 excludes the BioHeritage Challenge funds dispersed to other organisations

The significant increase in Core funding in Impact 4.2 in 2013/14 to this Outcome reflects a decision to re-direct a portion of funding for our biological collections and databases from Outcome 1 to better support national biosecurity goals, particularly in productive landscapes. 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, particularly the primary sector. As an example, there is increasing interest by the private sector in valuing ecosystem services, and having access to information and tools to facilitate decisions taking into account the impacts on ecosystem functions.

Core-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 Micro-Organisms from Plants
- Allan Herbarium
- Land Resource Information System (LRIS), which comprises the New Zealand Land Resource Inventory (NZLRI) and the National Soils Database (NSD)

Ongoing knowledge and technology transfer initiatives

Much of our research is used to help set public-sector policies and regulation in support of sustainable environmental practices in New Zealand. However, this same research is increasingly relevant to private sector interests, iwi and Māori agri-businesses seeking to operate within environmental limits. Community groups are increasingly well-informed and expect access to up-to-date information. Within this Outcome, we undertake a wide variety of ongoing knowledge and technology initiatives, many of which are well integrated with initiatives in other Outcomes (1 and 2 in particular).

We principally focus on:

- Making key data and information readily available to biosecurity agencies and primary sector groups through:
    - High-profile internationally-recognised publications on weeds, pests and diseases and the taxonomy of New Zealand's flora, fauna, fungi and bacteria, all of which underpin biosecurity policy, decisions and management
    - Open access online information resources (including definitive names) and data portals and user-friendly identification guides to support biosecurity
    - Specialist species identification services (including DNA technologies) and risk management advice to support biosecurity agencies and the primary sector
- Delivering workshops, presentations, policy advice and summary information to:
    - Central government, regional councils and industry and business groups
    - National and international technical advisory groups
    - Community interest groups and NGOs
- Providing best practice advice and guidelines for:
    - National Pest Control Agencies (NPCA) and MPI 'toolbox' committees
    - DOC, OSPRI and TBfree New Zealand, MPI, regional councils, private contractors and the dairy, beef and deer industries on pest management, TB management and surveillance systems
    - The mining sector on site rehabilitation and restoration
    - The Sustainable Business Council, BusinessNZ and Māori corporations on sustainable environmental practices and market requirements, particularly for the food and beverage sector
    - Fertiliser Association of New Zealand and MPI on managing cadmium in soils
    - Iwi, community groups and regional councils, especially in regard to participatory processes in water reforms, pest management
- Developing stakeholder capability and capacity, including:
    - Secondments to TBfree New Zealand to help operationalise research recommendations
    - Training seminars and workshops for end users, e.g. weed biocontrol, 'Biosecurity Bonanza', Biosecurity Institute National Education Training Seminar (NETS), and plant and fungi identification courses for biosecurity managers
    - Citizen science projects within landscape-scale pest management in Hawkes Bay

Key research initiatives 2015/16

Impact 4.1 Factors (including the form of institutions) required to resolve complex environmental issues, adapt to global change and reduce vulnerability to resource scarcity are understood and recognised.	**Increase government, private sector and community responses to complex environmental issues by:** • Enhancing participatory processes to underpin biodiversity, freshwater and landscape management policies and practices • Increasing capacity to undertake cost/benefit analyses to inform invasive species management • Developing frameworks and models to integrate the value of ecosystem services into policy, regulation and management **Improve New Zealanders' ability to adapt to global change and reduce vulnerability to resource scarcity by:** • Refining economic and economic assessment models to develop climate change policy • Continuing to enhance collaborative processes to support freshwater and biodiversity management • Continuing to refine decision-support tools and engagement processes to enable councils, communities and Māori to understand the impacts of various natural resource management options	**Measure of success (KPI)** Industry sectors, central and local government are making strategic use of research findings, associated indicators of performance, and new economic instruments to respond to complex environmental issues, global change processes and resource scarcity.
Impact 4.2 Best solutions that integrate economic, social, cultural and environmental perspectives to maintain or enhance international competitiveness, market access and social licence for business and industry to operate.	**Increase the delivery of integrated tools and approaches to support government, business and industry by:** • Enhancing our economic modelling to support more informed land management decisions • Developing culturally appropriate tools to support iwi decision-making relating to natural resources • Continuing to develop our rural survey to provide insight on primary sector decision-making drivers **Maintain and enhance social licence for business and industry to operate by:** • Increasing the effectiveness of rabbit control approaches which have high consumer acceptability • Ongoing work to develop weed biocontrol agents, including aquatic biocontrol agents, to reduce costs and pesticide use by landowners and electricity generators • Continuing to reduce costs, increase social acceptability and increase the effectiveness of possum control • Developing new approaches to multi-species predator control, including low-toxin, socially acceptable approaches **Maintain and enhance market access for New Zealand business by continuing to:** • Develop high-tech, next-generation techniques to reduce the number and extent of invasive mammals • Develop more effective ways of demonstrating TB freedom in support of agricultural market access • Improve surveillance, detection and control technologies and strategies for pest species • Support biosecurity risk assessment and management by developing new DNA diagnostic tools for rapid identification of high-priority species, and enhancing online access to new research and data in support of New Zealand disease-freedom status • Develop a 'dashboard' for primary industry to demonstrate environmental performance	**Measures of success (KPI)** An industry sector (dairy, horticulture or energy) is using a framework for integrating economic, environmental, social and/or cultural drivers to meet community and/or market requirements. Bovine TB is eradicated from vector populations in two extensive and difficult forest areas.

Infrastructure

Landcare Research has an ongoing programme to upgrade buildings and research infrastructure at our various sites. This is to ensure we have fit-for-purpose facilities to deliver effective research and outcomes into the future, and smart systems and processes to support our people in their work.

At Lincoln (our largest site) we are working closely with our partners in the Lincoln Hub (page7) to ensure our projects are consistent with opportunities for shared infrastructure and access to specialist facilities. Similarly, our other larger sites are located on or near university campuses to facilitate shared access to specialist infrastructure, research collaboration, lecturing and supervising postgraduate students.

We remain committed to a number of virtual initiatives such as the National Science Challenges (page 7), Centres of Research Excellence (CoREs), and national and global research consortia such as collaborative research centres. We also partner in the National e-Science Infrastructure (NeSI) (*see below*).

National e-Science Infrastructure (NeSI)

Landcare Research is a partner in the NeSI investment by Government, universities and CRIs to build and operate four 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 for the country, some of which have been built up over more than a century. We periodically review the collection vaults 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 to meet good practice standards). We are now investing significantly to put information, images and information online in order to increase the relevance, impact and reach of our collections. This will enhance the value of many years of Crown investment in them.

Collection digitisation and biological distribution modelling

'Digitising' high-priority insect, plant, fungal and bacterial specimens and associated data from our Core-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 these 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

Our wholly-owned subsidiary company Enviro-Mark Solutions provides a range of environmental certification services that are strongly aligned to our Core Purpose, particularly Outcome 4 (Development within Environmental Limits). Enviro-Mark Solutions offers the independently-audited CEMARS®, carboNZeroCert™, Energy-Mark® and Enviro-Mark® certification programmes to clients in New Zealand, and the CEMARS and carboNZero programmes are also offered overseas, for example through Achilles Information in the UK and PE International in Germany.

The CEMARS programme focuses on carbon management – measuring and managing greenhouse gas emissions to reduce the carbon footprint of organisations. The carboNZero programme follows the CEMARS steps but also includes the mitigation and offsetting of emissions to ensure carbon-neutrality. The Landcare Research parent company is itself carboNZero certified, with processes and data verified by an independent third party. Enviro-Mark Solutions is accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ), and also licensed by the UK Environment Agency and recognised by the Carbon Disclosure Project (CDP). Listed companies receive 10–15% more points in their CDP score if they are CEMARS certified.

The Energy-Mark certification programme is a joint initiative from Enviro-Mark Solutions and Energy Management Association of New Zealand (EMANZ). The programme is a simple, three-step process, with a focus on continual improvement as companies work from Bronze to Gold level. Energy-Mark Gold, the final step, is equivalent to ISO 50001. In the UK, CEMARS has been recognised by the UK Government as a route to compliance in the statutory guidance for the Energy Savings and Opportunities Scheme (ESOS).

The Enviro-Mark Environmental Management programme is a five-step journey to improved environmental performance by focusing on continuous improvement from Bronze to Diamond level. At Enviro-Mark Gold level, member companies are recognised as having an ongoing measurable environmental improvement programme. Enviro-Mark Diamond, the final step, is equivalent to ISO 14001.

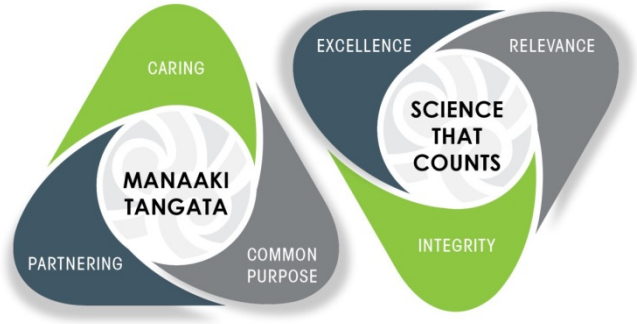
While Enviro-Mark Solutions is a standalone company with separate premises in Auckland, it shares facilities and resources at our Lincoln and Wellington sites; it follows the same accounting and general business, good employer and EEO practices and processes as the parent company.

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

High Performance Culture

Our goal is to foster the ongoing development of a vibrant, thriving, healthy and high-performing organisation. A working group of senior and mid-level leaders has supported key strategic areas underpinning our culture, values and performance – particularly leadership development programmes and capability planning and development. Future focus for this group will be reward and recognition, learning and development, internal communication and staff wellbeing.

Landcare Research Values:



Leadership development

Landcare Research has developed a leadership programme, consistent with the pan-CRI framework, with formal training modules for senior leaders, established mid-level leaders, and new and aspiring leaders. The model incorporates 360 degree assessment and is supported by coaching (internal and external), online learning tools and a rigorous evaluation methodology. The premise of the programme is to build fundamental capability across strategic and operational elements of leadership with a focus on both internal and external relationships.

Good employer

Landcare Research has had tertiary accreditation (the highest level) in ACC's programme for Workplace Safety Management Practices for 10 years, which reflects our commitment to best-practice health and safety and the well-being of staff and their families. Considerable effort has already gone into preparing for the pending health and safety legislative changes, including the development of a Board Health and Safety Leadership Charter, new processes to manage the safety of non-employees (e.g. visiting scientists) and contractors, and establishing health monitoring programmes for high risk areas.

Good employer performance, including equal opportunity monitoring, is updated annually in a comprehensive section on our website: www.landcareresearch.co.nz/about/sustainability/our-sustainability-progress/our-people

Research excellence and collaboration

Our scientists are recognised internationally for their research excellence, as evidenced by the number and quality of our publications and extensive co-authorship with overseas colleagues on global issues. We support this culture of excellence in a number of ways, including scholarships and fellowships. Our Science Advisory Panel of internationally well-regarded scientists provides valuable guidance.

Many of our scientists hold positions on editorial boards of prestigious national and international science journals, and are invited or elected to national and international panels, advisory boards and technical working groups.

We continue to collaborate with a large number of organisations overseas. Recognition of the excellence and relevance of our contributions at scientific meetings worldwide is highlighted by the number of invitations to our scientists to present keynote papers.

Landcare Research is a partner in several collaborative research centres, networks and consortia that pool capability in science areas relevant to the scope of our operations as outlined in our Statement of Core Purpose. We are currently collaborating with four National Science Challenges and two Centres of Research Excellence (CoREs).

Writing scholarships

We offer writing scholarships for up to 20 staff, facilitating peer-reviewed high-quality publications from existing data and reports. In the first year this scheme has been very successful and we will continue this initiative.

Fellowships

We support our scientists to travel overseas to work in prestigious, targeted organisations and visiting scientists to work with our staff. This encourages innovative new ideas and fosters enduring, productive relationships with other organisations. In this financial year we have allocated our Manaaki Tangata Fellowship to two scientists to work at the University of Sydney and Trinity College, Dublin.

Capability planning and development

The development of Strategy 2017 has provided a focus for a review of our capability needs to support changing client needs. We have assessed science capabilities across Landcare Research in relation to new opportunities and research priorities. This has highlighted critical gaps in our capability, which we will actively address over the next three years through new appointments and training for existing research staff.

We expect to make 15 new appointments to boost capability over the next three financial years. In addition, we will be appointing new staff with specialist capabilities in knowledge brokering, market development and development of commercial products and services for primary sector and other private sector clients.

Science Advisory Panel

The high priority areas for capability growth have been endorsed by our Science Advisory Panel. The Panel comprises active, internationally-recognised scientists who are able to provide strategic perspectives of changing global research activities in the context of New Zealand needs. (More information about the Panel is available on our website www.landcareresearch.co.nz/about/people) The Panel reviews our research performance and capabilities and provides advice to our Board on the allocation of resources to priority areas.

Vision Mātauranga

Vision Mātauranga is central to the delivery of our National Outcomes and growing our Māori capability in science research is essential to this. We have already appointed new Māori staff to science teams and are recruiting a General Manager Māori Development. A strategic focus will be to support the integration of cultural values into land and freshwater policy and practices, and research into development opportunities for Māori land, and amplify the use of our land information and tools in the Māori agri-business sector.

Links with universities and the Lincoln Hub

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 post graduate school with Lincoln University and other partners in the Lincoln Hub.

The vision is that the Lincoln Hub will 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 to result in the better management of New Zealand's land and water resources.

Performance Monitoring & Reporting

Milestones for Landcare Research's strategic focus (see page 5)

- **Increasing the value of our science:** The scope of our research and the ways in which we engage with our stakeholders are informed from a series of case studies
- **Enhancing environmental information:** National and regional environmental reporting indicators incorporate our research outputs and datasets
- **Improving freshwater management:** Limit-setting processes under the National Policy Statement on Freshwater Management are informed by our research and models
- **Sustainable primary sector growth:** Increased number of projects with the primary sector
- **Developing Māori land:** New partnerships and projects with Māori entities and agri-business
- **BioHeritage Challenge:** All seven planned science projects are initiated
- **Lincoln Hub:** MOU (or equivalent) signed with at least two private sector entities for joint R&D activities

Other key indicators, measures and targets

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	2013/14 Actual	2015/16 Target
End user collaboration	Revenue per FTE from commercial sources ($000s)[1]	$49.5	>$60
Research collaboration	Percentage of papers co-authored[1] – total Co-authored with other New Zealand organisations Overseas co-authors Both New Zealand and overseas co-authors	81% 29% 31% 21%	80% 30–35% 30–35% 20-25%
Technology and knowledge transfer	Commercial reports per scientist FTE[1] (definition updated 2015/16)	0.67	0.80
	Availability of data from our Core-funded databases, collections and information systems (assessed by a variety of metrics appropriate to each; metrics online)	Refer 2014 annual report	Increasing trends
	Response rate for requests to for our Core-funded biological collections and associated infrastructure (specimen transactions, identifications, visits) – new KPI for 2015/16	Not available	90–100%
	New and improved products, processes and services	40	40
	Presentations to stakeholders and community groups	215	200
Science quality	Impact of scientific publications (mean citation score) [1]	3.1	2.9–3.3
Financial indicator	Revenue per FTE ($000s)[1]	$162	>$179
Stakeholder engagement	Percentage of relevant end users who have adopted knowledge and/or technology from Landcare Research [2]	94%	90–100%
	Percentage of relevant funding partners and other end users that have a high level of confidence in our ability to set research priorities	72%	80–100%
	Percentage of relevant national and international research providers that have a high level of confidence in our ability to form the best teams to deliver on its Impacts and Outcomes	92%	90–100%
	Staff invited to participate in stakeholder meetings or workshops	207	210
Māori development	Number of partnerships with iwi and Māori organisations linking science and mātauranga to Māori goals and aspirations	22	18–23
Commercialisation	Number of new and existing licensing deals of Landcare Research-derived IP (including technologies, products and services)	3	5–10
High performance culture	Staff engagement in survey evaluations	79%	>80%
	Turnover of key science staff (new definition in 2014/15)	6.6%	3–5%

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; next survey 2015/16*

Financial Resilience

Context

Landcare Research needs flexibility to respond to changes in the external environment and pursue 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 be sustainable to support and enable the organisation
- The Board proposes a lower tailored return on equity 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 return on equity will be reviewed by the Board over the planning period as other strategic investment opportunities with long-term benefits are presented

The Core Funding Agreement, which expires on 30 June 2016, has historically provided a degree of certainty but no recovery of inflation. We expect strong competition in the science sector for other sources of government and private sector revenue. The future models for Core and Contestable funding have not yet been determined. We have made the financial assumption that equivalent funding will continue to be received to support our Statement of Core Purpose. Our ability to ensure financial viability through a sustained period of fiscal pressure will be critical to the ongoing success of Landcare Research.

Financial Operating Plan

The Operating Plan shows expected improvement in financial performance. The material assumptions underpinning the financial projections include:

- Annual increases in commercial revenue
- Efficiency gains to offset inflationary increases on operating costs
- The Board monitors progress and the Senior Leadership Team will take appropriate action if projections appear unlikely

Financial performance and position (consolidated group)

For the year ending 30 June:	2015		2016	2017	2018	2019	2020
	Target	Forecast	Target	Target	Target	Target	Target
Revenue	58.7	57.7	59.2[1]	62.2[1]	64.3	65.5	66.9
EBIT[2]	2.0	2.0	2.1	2.3	2.4	2.7	3.3
Total Assets	42.1	47.8	50.0	52.0	54.0	56.2	58.9
Capital Expenditure	3.7	2.4	5.5	8.8	4.7	4.1	4.6
Dividend	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity ratio[3]	72.0%	65.7%	65.8%	66.4%	67.3%	68.3%	69.2%
Gearing[4]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Explanatory notes to table:

[1] Revenue growth in 2016 and 2017 includes BioHeritage Challenge funds dispersed to other organisations. Landcare Research is the host for this Challenge and we are contractually responsible to MBIE for delivery of the Challenge work programme

[2] *EBIT*: Earnings before interest, financial lease charges and tax, and after committed business development expenditure and technology service expenditure

[3] *Equity ratio*: Average shareholders' funds ÷ Average total assets

[4] *Gearing*: Interest bearing debt ÷ Interest bearing debt + shareholders' funds, expressed as a percentage

Reinvestment of surplus

We continue to reinvest surpluses in strategic investment opportunities that will create long-term benefits, provided we have both capacity to invest and Landcare Research's long-term rate of return at least equals our weighted average cost of capital. During the planning period, we intend to reinvest surpluses with an EBIT impact of $0.4–$0.6 million each year. This will be financed from both science research surplus and the performance of prior investments. Strategic investments planned for 2015/16 are set out on page 23.

Financial strength and flexibility

Landcare Research's financial performance is projected to improve over the planning period, and a strong balance sheet continues to provide flexibility. Landcare Research aims to grow its revenues in the next five years to $66.9 million and EBIT to $3.3 million. Landcare Research's tailored return on equity for 2015/16 is 5.0%. The tailored return on equity recognises the investment made in Collections and Databases for the benefit of New Zealand, and for which a commercial return cannot be expected.

Key performance indicator: *The Landcare Research Group shows continuous improvement in efficiency, while maintaining growth, investment and appropriate levels of risk.*

	Actual	Forecast	Business Plan				
For year ending 30 June:	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Efficiency:							
Operating margin[1]	13.3%	10.6%	10.4%	10.3%	10.2%	10.5%	11.1%
Profit/ FTE	$21,525	$18,412	$18,499	$19,263	$19,675	$20,644	$22,403
Risk:							
Quick ratio[2]	0.91	1.32	1.33	1.02	1.14	1.33	1.51
Interest coverage[3]	658.4	1223.6	614.2	639.5	653.2	685.4	743.8
Profit volatility	12.7%	13.1%	12.0%	12.0%	7.0%	4.7%	7.5%
Forecasting risk[4]	0.9%	-0.1%	-0.7%	-0.5%	0.2%	0.1%	0.0%
Tailored return on equity							
RoE before Collections and Databases	10.0%	7.8%	7.8%	7.9%	7.9%	8.3%	9.0%
RoE before Investment	9.2%	6.9%	6.9%	6.9%	6.8%	7.1%	7.7%
RoE NPAT[5]	7.2%	5.0%	5.0%	5.1%	5.1%	5.5%	6.2%
Growth/Investment:							
Revenue growth	-1.4%	5.3%	2.6%	5.2%	3.3%	1.8%	2.2%
Capital renewal[6]	0.8	0.6	1.4	2.2	1.1	1.0	1.1

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] Forecasting Risk: 5-year average of return on equity less forecast return on equity

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

[6] Capital renewal: Capital expenditure ÷ depreciation expense plus amortisation expense

Appendices

Appendix 1: Nationally Significant Collections, Databases & 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 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

New Zealand Fungal & Plant Disease Collection (PDD)

- 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://nzfungi.landcareresearch.co.nz
http://virtualmycota.landcareresearch.co.nz
http://fungalguide.landcareresearch.co.nz
http://scd.landcareresearch.co.nz

International Collection of Micro-Organisms from Plants (ICMP)

- Living cultures of more than 18,000 strains of bacteria and fungi from plants and soil.
- All information fully searchable on-line.
- 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.

www.landcareresearch.co.nz/databases/icmp
http://scd.landcareresearch.co.nz

Allan Herbarium (CHR)

- New Zealand's national herbarium with >600,000 specimens of New Zealand and South Pacific algae, lichens, liverworts, mosses, ferns, and seed plants collected in New Zealand. The oldest samples collected during Captain Cook's first voyage to New Zealand, 1769–1770.
- Online access via the New Zealand Virtual Herbarium, a searchable, downloadable information system.
- 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 Vegetation Survey (NVS)

- The national repository for plot-based vegetation (forestry) survey data collected, with over 60 years of data.
- A physical archive and databank of records from >94,000 survey plots including >19,000 permanent plots.
- Broad geographic coverage, from Northland to Stewart Island, the Kermadec and Chatham Islands.
- 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/

National New Zealand Flax Collection

- 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
http://scd.landcareresearch.co.nz

Ngā Tipu Whakaoranga Ethnobotany database

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

http://Māori plantuse.landcareresearch.co.nz/

Land Resource Information System (LRIS), including New Zealand Land Resource Inventory(NZLRI)

- National database 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

National Soils Database (NSD)

- Physical collection of thousands of soil profiles from 1,700 different locations throughout New Zealand, with site descriptions and chemical, physical, and mineralogical characterisations available online.

Appendix 2: Financial Policies

Dividend policy

Principles adopted for determining annual 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
- The Company's working capital requirements (including subsidiaries and businesses in which equity is held)
- Ongoing financial viability of the Company, including its ability to repay debt
- 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

In a submission to shareholding Ministers, within four months of the end of each financial year, the Board will detail the:

- Amount of dividend (if any) recommended to be distributed to the shareholders
- Percentage of tax-paid profits that the dividend represents
- Rationale and analysis used to determine the amount of dividend

Estimate of the amount or proportion of annual tax-paid earnings

An estimate of the amount or proportion of annual tax-paid earnings (from both capital and revenue sources) that is recommended to be distributed to the Crown is provided below, taking into account the statutory requirement to remain financially viable and the following considerations:

- Shareholder policies on dividends and target levels of debt as expressed in the Operating Framework for CRIs
- The Company's peak debt level being within the acceptable range estimated in the Capital Structure Plan (independently assessed in May 2006 and reassessed internally in November 2010)
- The Company's three times interest cover covenant, which could be breached with increased borrowing required to fund a dividend
- The range of investment and technology service opportunities available to the Company as set out in its business plan and agreed with shareholding Ministers and the likely requirement to maintain borrowings to fund such projects
- The increased level of capital expenditure required to maintain the Company's science capability and achieve productivity gains through support services
- The Company's projected need for capital to enhance building and IT systems' infrastructure
- The Company's projected need for strategic investment to accelerate the creation of national benefit by increasing Landcare Research's science competitiveness and shortening lead times of new knowledge and technologies to market

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 3: Accounting Policies

Reporting entity

Landcare Research New Zealand Limited is a Crown Research Institute governed by the Crown Research Institutes Act 1992 and Crown Entities Act 2004. The Landcare Research Group ('the Group') consists of Landcare Research New Zealand Limited and its 100% owned subsidiaries Enviro-Mark Solutions Limited and Landcare Research US Limited. Landcare Research New Zealand Limited and Enviro-Mark Solutions Limited are incorporated in New Zealand; Landcare Research US Limited is incorporated in the USA.

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

Basis of preparation

The financial statements of the Group have been prepared in accordance with the requirements of the Crown Entities Act 2004, which includes the requirement to comply with New Zealand generally accepted accounting practice (NZ GAAP). These financial statements comply with NZ IFRS, and other applicable financial reporting standards, as appropriate for profit-oriented entities.

The accounting policies set out below have been applied consistently to all periods presented in these financial statements.

The financial statements have been prepared on a historical cost basis modified by revaluation of certain financial instruments. The financial statements are presented in New Zealand dollars, the functional currency of the Group, and all values are rounded to the nearest thousand dollars ($000).

Foreign currency transactions are translated into the functional currency using the exchange rates prevailing at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such transactions are recognised in the surplus or deficit.

Subsidiaries

Where the Group has the capacity to control the financing and operating policies of an entity, so as to obtain benefits from its activities, all such entities are consolidated as subsidiaries within the Group financial statements. This power exists where the Group controls the majority voting power on the governing body, or where such policies have been irreversibly predetermined by the Group, or where the determination of such policies is unable to materially impact the level of potential ownership benefits that arise from the activities of the subsidiary.

The Group measures the cost of a business combination as the aggregate of the fair values, at the date of exchange, of assets given, liabilities incurred or assumed, in exchange for control of the subsidiary plus any costs directly attributable to the business combination. Any excess of the cost of the business combination over the Group's interest in the net fair value of the identifiable assets, liabilities and contingent liabilities is recognised as goodwill. If the Group's interest in the net fair value of the identifiable assets, liabilities and contingent liabilities recognised exceeds the cost of the business combination, the difference will be recognised immediately in the surplus or deficit.

Basis of consolidation

The purchase method is used to prepare the consolidated financial statements; this involves adding together like items of assets, liabilities, equity, income and expenses on a line-by-line basis. All significant intragroup balances, transactions, income and expenses are eliminated on consolidation.

Landcare Research New Zealand Limited's investment in its subsidiaries is carried at cost in its 'Parent entity' financial statements.

Revenue

Revenue is measured at the fair value of consideration received.

Revenue from the rendering of services is recognised by reference to the stage of completion of the transaction at balance date, based on the actual service provided as a percentage of the total services to be provided. Income received for goods and services which have not yet been supplied to customers has been recognised as Revenue in Advance. Sales of goods are recognised when a product is sold to the customer.

Core funding from the Ministry of Building, Innovation and Employment (MBIE), previously the Ministry of Science and Innovation (MSI) is treated as a government grant and generally recognised in the year of receipt. The only exception is where MBIE gives prior written consent to carry over to the next financial year any part of the Core funding that will be allocated to specified long-term or large-scale research activities that require the accumulation of funds over two or more financial years to fully fund those activities.

Interest income is recognised using the effective interest method, whereby the estimated future cash receipts are exactly discounted from the net carrying amounts through the expected life of the financial assets.

Dividends are recognised when the right to receive payment has been established.

Borrowing costs

Borrowing costs consist of interest and other costs that an entity incurs in connection with the borrowing of funds. Borrowing costs directly attributable to the acquisition, construction or production of a qualifying asset (i.e. an asset that necessarily takes a substantial period of time to get ready for its intended use or sale) are capitalised as part of the cost of that asset in accordance with NZ IAS 23 Borrowing costs (revised). All other borrowing costs are expensed in the period they occur.

Income tax

Income tax expense in relation to the surplus or deficit for the period comprises current tax and deferred tax.

Current tax is the amount of income tax payable based on the taxable profit for the current year, plus any adjustments to income tax payable in respect of prior years. Current tax is calculated using rates that have been enacted or substantively enacted by balance date.

Deferred tax is the amount of income tax payable or recoverable in future periods in respect of temporary differences and unused tax losses. Temporary differences are differences between the carrying amount of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit. Deferred tax *liabilities* are generally recognised for all taxable temporary differences. Deferred tax *assets* are recognised to the extent that it is probable that taxable profits will be available against which the deductible temporary differences or tax losses can be utilised. Deferred tax is not recognised if the temporary difference arises from the initial recognition of goodwill, or from the initial recognition of an asset and liability in a transaction that is not a business combination, and at the time of the transaction affects neither accounting profit nor taxable profit. Deferred tax is recognised on taxable temporary differences arising on investments in subsidiaries and associates, and interests in joint ventures, except where the Company can control the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future. Deferred tax is calculated at the tax rates that are expected to apply in the period when the liability is settled or the asset is realised, using tax rates that have been enacted or substantively enacted by balance date.

Current tax and deferred tax is recognised against the surplus or deficit, except to the extent that it relates to a business combination, or to transactions recognised in other comprehensive income or directly in equity.

Finance leases

A finance lease is a lease that substantially transfers to the lessee all risks and rewards incidental to ownership of an asset, whether or not title is eventually transferred.

At the commencement of the lease term, the Group recognises finance leases as assets and liabilities in the statement of financial position at the lower of the fair value of the leased item or the present value of the minimum lease payments. The amount recognised as an asset is depreciated over its useful life. If there is no certainty as to whether the Group will obtain ownership at the end of the lease term, the asset is fully depreciated over the shorter of the lease term and its useful life.

Operating leases

An operating lease is a lease that does not substantially transfer all the risks and rewards incidental to ownership of an asset. Lease payments under an operating lease are recognised as an expense on a straight-line basis over the lease term. Lease incentives received are recognised evenly over the term of the lease as a reduction in rental expense.

Cash and cash equivalents

Cash and cash equivalents include cash in hand, deposits held at call with banks, other short-term highly liquid investments with original maturities of three months or less, and bank overdrafts. Bank overdrafts are shown within borrowings in current liabilities in the statement of financial position.

Trade and other receivables

Trade and other receivables are initially measured at fair value and subsequently measured at amortised cost using the effective interest method, less any provision for impairment.

Loans are initially recognised at the present value of their expected future cash flows, discounted at the current market rate of return for a similar asset/investment. They are subsequently measured at amortised cost using the effective interest method. The difference between the face value and present value of expected future cash flows of the loan is recognised in the statement of comprehensive income as a grant.

A provision for impairment of receivables is established when there is objective evidence that the Group will not be able to collect all amounts due according to the original terms of receivables. The amount of the provision is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted using the effective interest method.

Inventories

Inventories (such as spare parts and other items) held for distribution or consumption in the provision of services that are not supplied on a commercial basis, are measured at the lower of cost and net realisable value. Inventories held for use in the production of goods and services on a commercial basis are valued at the lower of cost and net realisable value. The cost of purchased inventory is determined using the average cost method. The write-down from cost to net realisable value is recognised in the surplus or deficit.

Financial assets

The Group classifies its financial assets into the following three categories: financial assets at fair value through profit or loss, loans and receivables, and financial assets at fair value through other comprehensive income. The classification depends on the purpose for which the investments were acquired. Management determines the classification of its investments at initial recognition and re-evaluates this designation at every reporting date.

Financial assets and liabilities are initially measured at fair value plus transaction costs unless they are carried at fair value through surplus or deficit, in which case the transaction costs are recognised in the surplus or deficit.

The fair value of financial instruments traded in active markets is based on quoted market prices at the balance sheet date. The quoted market price used is the current bid price. The fair value of financial instruments that are not traded in an active market is determined using valuation techniques. The Group uses a variety of methods and makes assumptions that are based on market conditions existing at each balance date. Quoted market prices or dealer quotes for similar instruments are used for long-term debt instruments held. Other techniques, such as estimated discounted cash flows, are used to determine fair value for the remaining financial instruments.

The three categories of financial assets are:

Financial assets at fair value through surplus or deficit

This category has two sub-categories: financial assets held for trading, and those designated at fair value through surplus or deficit at inception. A financial asset is classified in this category if acquired principally for the purpose of selling in the short term, or if designated as so by management. Derivatives are also categorised as held for trading unless they are designated as hedges. Assets in this category are classified as current assets if they are either held for trading or are expected to be realised within 12 months of the balance sheet date. After initial recognition they are measured at their fair values. Gains or losses on remeasurement are recognised in the surplus or deficit. Financial assets in this category include foreign currency forward contracts.

Loans and receivables

These are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. After initial recognition they are measured at amortised cost using the effective interest method. Gains and losses when the asset is impaired or derecognised are recognised in the surplus or deficit. 'Trade and other receivables' are classified as loans and receivables in the statement of financial position.

Financial assets at fair value through other comprehensive income

Financial assets at fair value through other comprehensive income are those that are designated as fair value through other comprehensive income or are not classified in any of the other categories above. This category encompasses:

- Investments that the Group intends to hold long term but which may be realised before maturity.
- Shareholdings that the Group holds for strategic purposes. The Parent's investments in its subsidiaries are not included in this category as they are held at cost (as allowed by NZ IAS 27 *Consolidated and Separate Financial Statements*) whereas this category is to be measured at fair value.
- Investment in Kiwi Innovation Network Limited.

After initial recognition, these investments are measured at their fair value. Gains and losses are recognised directly in other comprehensive income except for impairment losses, which are recognised in the surplus or deficit. In the event of impairment, any cumulative losses previously recognised in other comprehensive income will be removed from other comprehensive income and recognised in the surplus or deficit, even though the asset has not been derecognised. On de-recognition, the cumulative gain or loss previously recognised in other comprehensive income is recognised in the surplus or deficit.

Impairment of financial assets

At each balance sheet date the Group assesses whether there is any objective evidence that a financial asset or group of financial assets is impaired. Any impairment losses are recognised in the surplus or deficit.

Accounting for derivative financial instruments and hedging activities

The Group uses derivative financial instruments to cover the risk on foreign exchange. In accordance with its treasury policy, the Group does not hold or issue derivative financial instruments for trading purposes.

Derivatives are initially recognised at fair value on the date a derivative contract is entered into and are subsequently remeasured at their value. The Group does not designate derivatives as a hedging instrument and therefore accounts for derivative instruments at fair value through profit or loss. Changes in the fair value of derivative instruments are recognised immediately in the surplus or deficit.

Non-current assets held for sale

Non-current assets held for sale are classified as held for sale if their carrying amount will be recovered principally through a sale transaction, not through continuing use. Non-current assets held for sale are measured at the lower of their carrying amount and fair value less costs to sell. Any impairment losses for write-downs of non-current assets held for sale are recognised in the surplus or deficit.

Any increases in fair value (less costs to sell) are recognised up to the level of any impairment losses that have been previously recognised. Non-current assets (including those that are part of a disposal group) are not depreciated or amortised while they are classified as held for sale. Interest and other expenses attributable to the liabilities of a disposal group classified as held for sale continue to be recognised.

Property, plant and equipment

Property, plant and equipment consist of:

- *Operational assets* – these include land, buildings, library books, plant and equipment, and motor vehicles.
- *Restricted assets* – these are collections and databases, held by the Group, that provide a benefit or service to the community and cannot be disposed of because of legal or other restrictions.
- *Capital work in progress* – this has been included within plant and equipment, and is not depreciated until ready for use.

Property, plant and equipment are shown at cost, less accumulated depreciation and impairment losses. Assets are not reported with a financial value in cases where they are not realistically able to be reproduced or replaced, and when they do not generate cash flows and where no market exists to provide a valuation.

Additions

The cost of an item of property, plant and equipment is recognised as an asset if, and only if, it is probable that future economic benefits or service potential associated with the item will flow to the Group and the cost of the item can be measured reliably. In most instances, an item of property, plant and equipment is recognised at its cost. Where an asset is acquired at no cost, or for a nominal cost, it is recognised at fair value as at the date of acquisition.

Disposals

Gains and losses are determined by comparing the proceeds with the carrying amount of the asset. Gains and losses on disposals are included in the surplus or deficit.

Subsequent costs

Costs incurred subsequent to initial acquisition are capitalised only when it is probable that future economic benefits or service potential associated with the item will flow to the Group and the cost of the item can be measured reliably.

Depreciation

Depreciation is provided on the Group's property, plant and equipment, other than land, at rates that will write off the cost of the assets to their estimated residual values over their useful lives. All Parent and Enviro-

Mark Solutions company depreciable assets are depreciated on a straight-line (SL) basis. The residual value and useful life of an asset is reviewed, and adjusted if applicable, at each financial year end.

Depreciation rates	Parent and Enviro-Mark Solutions (SL)
Buildings	1.67–10%
Plant and equipment	4–33%
IT equipment	25%
Motor vehicles	25%
Furniture and fittings	6.67–10%
Office equipment	20%
Finance lease assets	20%
Library books and periodicals	20–50%
Rare books collections	1%

Intangible assets

Software acquisition and website development costs

Acquired computer software licences are capitalised on the basis of the costs incurred to acquire and bring to use the specific software. Costs associated with maintaining computer software and websites are recognised as an expense when incurred. Costs that are directly associated with the development of software and websites for internal use by the Group are recognised as an intangible asset. Direct costs include the software development employee costs and an appropriate portion of relevant overheads.

Patents and intellectual property

Patents and intellectual property are capitalised on the basis of costs incurred.

Amortisation

The carrying value of an intangible asset with a finite life is amortised on a straight-line basis over its useful life. Amortisation begins when the asset is available for use and ceases at the date that the asset is derecognised. The amortisation charge for each period is recognised in the surplus or deficit. The useful lives and associated amortisation rates of major classes of intangible assets have been estimated as follows:

- Computer software 4 years 25%
- Intellectual property 3–20 years 5–35%

Impairment of non-financial assets

Non-financial assets that have an indefinite useful life are not subject to amortisation and are tested annually for impairment. Assets that have a finite useful life are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable.

An impairment loss is recognised for the amount by which the asset's carrying amount exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs to sell and value in use.

Value in use is depreciated replacement cost for an asset where the future economic benefits or service potential of the asset are not primarily dependent on the asset's ability to generate net cash inflows and where the entity would, if deprived of the asset, replace its remaining future economic benefits or service potential. The value in use for cash-generating assets is the present value of expected future cash flow.

If an asset's carrying amount exceeds its recoverable amount the asset is impaired and the carrying amount is written down to the recoverable amount. The total impairment loss is recognised in the surplus or deficit.

Employee benefits

Short-term benefits

Employee benefits that the Group expects to be settled within 12 months of balance date are measured at nominal values based on accrued entitlements at current rates of pay. These include salaries and wages accrued up to balance date, annual leave earned to but not yet taken at balance date, retiring and long service leave entitlements expected to be settled within 12 months, and sick leave.

The Group recognises a liability for sick leave to the extent that absences in the coming year are expected to be greater than the sick leave entitlements earned in the coming year. The amount is calculated based on the unused sick leave entitlement that can be carried forward at balance date, to the extent that the Group anticipates leave entitlements will be used by staff to cover those future absences.

The Group recognises a liability and an expense for bonuses where contractually obliged or where there is a past practice that has created a constructive obligation.

All actuarial gains and losses that arise subsequent to the transition date in calculating the Group's obligation with respect to long service leave, retirement gratuities and sick leave are recognised as an expense in the surplus or deficit.

Superannuation schemes

- *Defined contribution schemes*: obligations for contributions to defined contribution superannuation schemes are recognised as an expense in the surplus or deficit as incurred.
- *Defined benefit schemes*: the Group makes contributions to the Government Superannuation Fund, which is a multi-employer defined benefit scheme. Insufficient information is available to use defined benefit accounting, as it is not possible to determine from the terms of the scheme the extent to which the surplus/deficit will affect future contributions by individual employers, as there is no prescribed basis for allocation. The scheme is therefore accounted for as a defined contribution scheme.

Long service leave, retirement leave and sick leave

Entitlements that are payable beyond 12 months, such as long service leave, retirement leave and sick leave, have been calculated on an actuarial basis. The calculations are based on likely future entitlements accruing to staff, based on years of service, years to entitlement, payment history, the likelihood that staff will reach the point of entitlement, and contractual entitlements information.

Provisions

The Group recognises a provision for future expenditure of uncertain amount or timing when there is a present obligation (either legal or constructive), as a result of a past event, that probable expenditures will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. Provisions are not recognised for future operating losses. Provisions are measured at the present value of the expenditures expected to be required to settle the obligation, using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the obligation. The increase in the provision due to the passage of time is recognised as an interest expense.

Borrowings

Borrowings are initially recognised at their fair value. After initial recognition, all borrowings are measured at amortised cost, using the effective interest method.

Goods and Service Tax (GST)

All items in the financial statements are stated exclusive of GST, except for receivables and payables, which are stated on a GST-inclusive basis. Where GST is not recoverable as input tax then it is recognised as part of the related asset or expense.

The net amount of GST recoverable from, or payable to, the Inland Revenue Department (IRD) is included as part of receivables or payables in the statement of financial position. The net GST paid to or received from the IRD, including the GST relating to investing and financing activities, is classified as an operating cash flow in the statement of cash flows.

Commitments and contingencies are disclosed exclusive of GST.

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Guide to Acronyms

ACC	Accident Compensation Corporation	www.acc.co.nz
DOC	Department of Conservation	www.doc.govt.nz
FAR	Foundation for Arable Research	www.far.org.nz
FOMA	Federation of Māori Authorities (Me Uru Kahikatea)	www.foma.org.nz
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
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
TPK	Te Puni Kōkiri	www.tpk.govt.nz

Landcare Research
Manaaki Whenua