

## A future view

Science and technology accelerates innovation and growth for intergenerational economic and environmental sustainability of the primary sector leading to increased wellbeing for all New Zealanders.

## Areas science needs to support

These four cross-sector areas, and their interlinkages, reflect the big challenges, with rapidly changing demands, for New Zealand's primary sector and serve as a focus for our future science needs and opportunities. The areas encompass the value chain from genes, biota, soils, land, water, air, through to production and handling systems, to products and the consumer.



## By the numbers

**\$37.5 billion**  
Primary sector exports



SOP1 2017

National  
**Science**  
Challenges

**7 of 11**  
National Science  
Challenges involved in  
primary sector science

**\$428 million**  
Government  
investment in  
primary sector  
science



**>\$266 million**  
Industry investment in  
primary sector science\*



R&D Survey 2016

Primary sector science  
makes up **18%** of  
New Zealand's science  
publications



Scival 2014-2016

**1740**  
Primary sector  
scientists in  
Crown research  
institutes alone



\* classified as research for the purpose of primary industries.

## Themes: the science we need

These eight interconnected science and technology themes make important contributions to the four areas science needs to support and are relevant to all primary industries, terrestrial- and aquatic-based.



### Adding value

Achieving greater profitability across the supply chain, driven by consumer and market insights and preferences, and co-innovation, resulting in a greater diversity of high-quality products and services.



### Harnessing the value and power of data

Advancing the definition and collection of critical data, use of connected data sources, data handling, interoperability, management and governance for more efficient and adaptable production systems that have a positive impact on the environment.



### Innovating with advanced technology

Developing and implementing new technologies, including advanced, disruptive, and transformational technologies to ensure the New Zealand primary sector is globally competitive.



### Innovating through genetics

Creating knowledge and techniques leading to plant and animal production that is more efficient, safer and adaptable, with less negative environmental impact, allowing rapid development of new generations of food and non-food products.



### Innovating through Kaupapa Māori

Contributing through Kaupapa Māori research approaches to distinctive and transferable primary sector innovation informed by tikanga Māori, mātauranga Māori and science working together.



### Protecting and sustaining resources

Future-proofing new and existing production systems so that terrestrial- and aquatic-based resources, are mapped, measured and monitored to protect the resources and support their use under rapidly changing conditions.



### Deriving value from complex systems

Enhancing sustainability of diversified and multifunctional, terrestrial- and aquatic-based systems and the development of novel products through better understanding and using complex systems.




### Integrating people and values

Supporting the development of future primary production systems that are publicly and socially integrated and enabling uptake of science and technology through effective engagement and partnerships.



**WALL-CLIMBING ROBOTS** that inspect large tanks with no risk to the operator are addressing primary sector health and safety challenges. This Kiwi-developed technology was designed to remotely inspect dairy equipment, but it can also be used for the inspection of a range of spaces such as wine tanks, aircrafts, grain silos and water tanks. Photo: Invert Robotics.

Link to themes:  



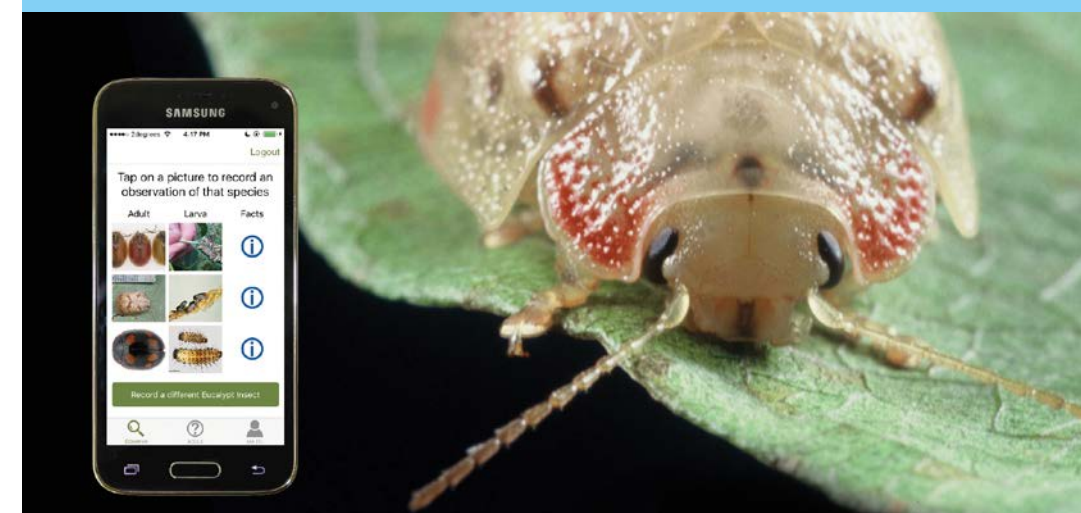
### THE WEB-BASED SUBSCRIPTION FORECASTING

and information service by NIWA uses very large multivariate datasets generated by numerical weather prediction models. This service provides location-specific 15-day forecasts that have huge economic and environmental benefits, such as for scheduling helicopter time for frost fighting over vineyards.

Link to themes:  

**A SMARTPHONE APP** uses citizen science for biosecurity surveillance, enabling Kiwis to easily report sightings of the eucalyptus variegated beetle. This app was developed by New Zealand science teams, the Ministry for Primary Industries, and industry and community groups, and could be used for a range of damaging pests and diseases.

Link to themes:   





# Science and technology at work for New Zealand's primary sector

**INNOVATIVE AND HIGH-QUALITY** dairy products are being produced with a focus on intergenerational and environmentally sustainable approaches. Kaitiakitanga is at the heart of Miraka's approaches such as using geothermal steam as a renewable energy source and processing and using by-products. Photo: Miraka.



Link to themes:    



**STRESS-FREE CAPTURE**, storage and transport has been developed for crayfish by international and New Zealand-based engineers and materials scientists, working in partnership with the seafood industry. This is allowing high-value products to reach overseas markets such as China in premium condition. Photo: T&J Enderby.

Link to themes:  

**TREE GENETIC IMPROVEMENT PROGRAMMES**, involving extensive breeding and silviculture practice, has led to significant profitability and productivity gains. These programmes have increased the present value of the national radiata pine estate by an estimated \$3.5 billion. The introduction of more highly improved tree stocks is underway, with an estimated value uplift of \$8.5 billion to the industry compared to using unimproved material.

Link to themes:   



## Guiding primary sector science and technology

The Roadmap provides an integrated view of the science and technology that is important to New Zealand's primary sector. It supports activities throughout New Zealand's science system including helping guide funding and investment decisions, align research, develop science capability, and encourage partnerships with industry and international collaborators.

The Ministry for Primary Industries provides oversight of the Roadmap, and is working with partners to support its use throughout the sector and update it over time to ensure it is a living document.

For a full copy of the Roadmap visit: [www.mpi.govt.nz/science-roadmap](http://www.mpi.govt.nz/science-roadmap)

## A part of the government's science strategy

This Roadmap is part of the government's overall strategy for the science system, as set out in the National Statement of Science Investment 2015-2025, and aligns with the Conservation and Environment Science Roadmap.

## Capability and capacity for the future

In the future, New Zealand's primary sector workforce will need a higher level of skills in the areas of science, engineering and technology. The primary sector will continue to rely on a range of pure and applied science and technology experts. It will be important that these skills are used in partnership and through interdisciplinary, cross-sectoral and cross-cultural approaches. Continued emphasis on extension and translation of science is needed to help the sector more rapidly adopt and adapt new knowledge and technologies for innovation and sustainability.



New Zealand Government



# Primary Sector Science Roadmap

## Te Ao Tūroa

Strengthening New Zealand's bioeconomy for future generations