

# *Our Land and Water National Science Challenge*

## Stocktake of Indicator Projects September 2017



Dr Richard McDowell  
Chief Scientist  
Our Land and Water National Science Challenge  
AgResearch – Lincoln Science Centre

2 October 2017

Dear Richard,

As per our contract received 4 July 2017, please find attached our stocktake of indicator projects. This report collates the information received from members of the Indicators Working Group and other agencies listed in Appendix A. Please note that this report should be read in conjunction with the restrictions at the end of this report.

Best regards,

A handwritten signature in black ink, appearing to read 'W- VSB', with a long horizontal flourish extending to the right.

Dr Bill Kaye-Blake

Director

Consulting

# Our Land and Water Challenge mission

## Mission

The Our Land and Water National Science Challenge has been charged with transforming the agriculture sector in New Zealand. Its mission is to enhance primary **production and productivity** while maintaining and improving our **land and water quality** for future generations.

The two long-term goals of the Challenge are to:

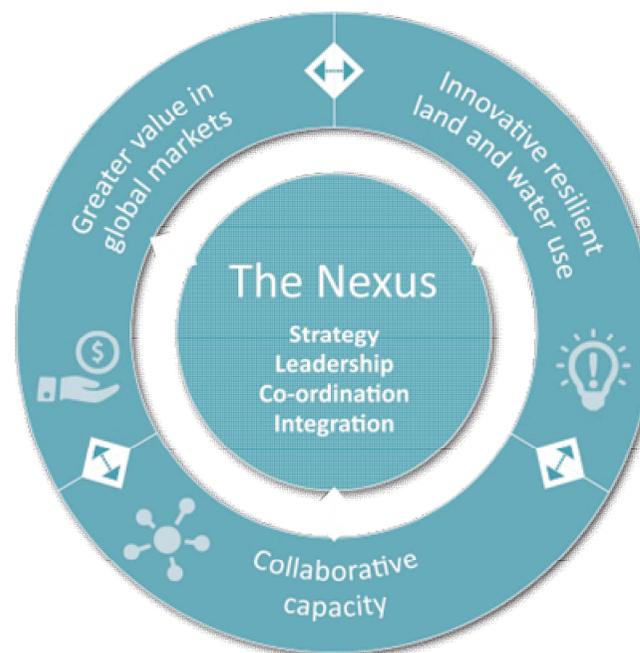
1. double the total value of export production to close to 40 per cent of GDP (**Economic** goal)
2. improve the performance of key indicators of land and water resources by 20 per cent at the enterprise and catchment scales (**Environmental** goal).

## Themes

The Challenge has three Themes

1. Greater value in global markets (**Economic**)
2. Innovative resilient land and water use (**Environmental**)
3. Collaborative capacity (**Institutional**).

The **Nexus** brings these themes together through strategy, leadership, co-ordination and integration.



# Indicators Working Group

To support the overall mission, the Challenge has convened a working group on indicators.

The working group brings together three elements:

- **Government** – setting policy and measuring against targets
- **Industry** – making land-use decisions
- **Scientists** – generating indicators through research.

The working group is supporting the goals of the Challenge by **coordinating and disseminating** existing work on indicators, and by identifying gaps and **providing direction** to the work of the Challenge and other organisations.

The aim is to find the right indicators, and encourage and enable their use.



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## ***Stocktake of indicator projects***

The Challenge needs to be able to clearly define the indicators and metrics it is using to measure progress against its two overarching goals. To do this it needs to understand both what indicators have already been developed and what gaps exist in the scheme of work being done on agri-environmental indicators.



We engaged with the member agencies of the Indicators Working Group and other relevant organisations in the New Zealand science and agriculture system to collate a stocktake of existing work on agri-environmental indicators relevant for the Challenge. Some of these focus on environmental linkages, while others focus on economic and production data.

The following tables present the known projects underway or completed across three areas:

- Government projects
- Industry projects
- Science projects.



This list may not be comprehensive, but can be updated over time as new work develops. We suggest that this information could be made available on the Our Land and Water website and maintained as a 'live' document.



# Government projects

| Project name                             | Project description  | Lead agency / person   | Project status     | Indicator data collected   | Data sources                          |
|--|--|--|--------------------|--|---------------------------------------|
| <b>Environmental reporting programme</b> | <p>Presents indicators and trends of environmental reporting across five environmental domains (land, marine, freshwater, air, atmosphere and climate) and the cross-domain area of biodiversity.</p> <p>Domain reports are published every six months, and synthesis reports are published every three years.</p> <p>Data is collected largely by NIWA, regional councils and territorial authorities, and is presented at a national scale. Adjustments are made to ensure the data is nationally consistent.</p> <p><a href="http://www.stats.govt.nz/browse_for_stats/environmental-reporting-series/environmental-indicators/Home.aspx">http://www.stats.govt.nz/browse_for_stats/environmental-reporting-series/environmental-indicators/Home.aspx</a></p> | MfE – Jean le Roux<br>Statistics NZ  | Ongoing since 2015 | Indicators have been chosen for each domain. For land and freshwater these include: Land cover, Soil erosion, Soil health and land-use, Land pests, River nitrogen, Groundwater quality, Lake water quality, trends in nitrogen leaching from agriculture. Full list of indicators is available at <a href="http://www.stats.govt.nz/browse_for_stats/environmental-reporting-series/environmental-indicators/Home/Browse%20by%20topic.aspx">http://www.stats.govt.nz/browse_for_stats/environmental-reporting-series/environmental-indicators/Home/Browse%20by%20topic.aspx</a> | Local and central government and CRIs |
| <b>MfE data service</b>                  | <p>MfE publishes datasets of environmental variables under open licenses at <a href="https://data.mfe.govt.nz/">https://data.mfe.govt.nz/</a></p>  | MfE – Jean le Roux   | Ongoing            | Raw data rather than indicators across the five environmental domains. Tabular and geospatial data.  | Local and central government and CRIs |
| <b>Land Air Water Aotearoa (LAWA)</b>    | <p>LAWA collates and presents information from regional councils on air and water quality. Covers coastal water quality, freshwater quality and quantity, and air quality information. Data on state and trends is presented for each region down to the catchment and monitoring site level.</p> <p><a href="https://www.lawa.org.nz/">https://www.lawa.org.nz/</a></p>   | Collaboration between all regional councils, Cawthron, MfE Massey University, Tindall Foundation | Ongoing            | Data availability varies by region and by site. Water quality principally includes bacteria, clarity, nitrogen, phosphorous. Raw values are available. Data is presented in quartiles. Some sites presented against NOF levels (A-D rating).   | Regional council monitoring data      |

# Government projects (continued)

| Project name   | Project description   | Lead agency / person                | Project status | Indicator data collected   | Data sources   |
|--|---|-------------------------------------|----------------|--|--|
| <b>Situation and Outlook for Primary Industries (SOPI)</b> | Shows historical and forecast export volume, prices, and revenue for the primary industries. Actual and provisional data are sourced from Statistics NZ, and the forecast data are provided by the MPI economic data and analysis team.   | MPI                                 | Ongoing        | Export volume, price and revenue data across the primary sector  | Statistics NZ, MPI   |
| <b>Agricultural Production Census/Survey</b>               | Every five years a census of agricultural production is carried out. Information is collected by questionnaire (postal or online) by farmers across 60,000 farms. In years without a census, a survey of a smaller number of farmers is completed instead.<br><a href="http://www.stats.govt.nz/survey-participants/a-z-of-our-surveys/agricultural-production-survey.aspx">http://www.stats.govt.nz/survey-participants/a-z-of-our-surveys/agricultural-production-survey.aspx</a>   | Statistics NZ / MPI                 | Ongoing        | Animal numbers, land use and land area, crop area and harvest, irrigation and fertiliser use, nutrient planning practices  | Statistics NZ  |
| <b>Agricultural GHG Inventory</b>                          | This model and database support the annual calculation of New Zealand's Agricultural GHG emissions for New Zealand's statutory annual reporting under the UNFCCC.   | MPI Inventory reporting team        | Ongoing        | Total GHG emissions by agriculture sector, including animal performance and numbers data. 25 years of data commencing 1990 | Statistics NZ DairyNZ, Beef and Lamb, Slaughter statistics MPI |
| <b>National Exotic Forest Description (NEFD)</b>           | The National Exotic Forest Description (NEFD) is a Tier 1 statistic of New Zealand's planted production forest estate (i.e. forest planted with the primary intention of producing wood or wood fibre). From its inception, the data captured has been required to be used for: <ul style="list-style-type: none"> <li>• Wood availability forecasting</li> <li>• Monitoring changes to the forest resource through time</li> <li>• Planning and investment analysis by the forest industry</li> <li>• Policy and reporting obligations.</li> </ul> | MPI Economic Data and Analysis team | Ongoing        | Forest ownership; Area and standing volume; harvesting and planting estimates; yield tables; age class distributions       | Forest owners  |

# Industry projects

| Project name                                | Project description  | Lead agency / person            | Project status                   | Indicator data collected  | Data sources                |
|---|--|---------------------------------|----------------------------------|---|-----------------------------|
| <b>New Zealand Farm Assurance Programme</b> | A unified audit system for farmers to demonstrate integrity, origin, traceability, bio-security, environmental sustainability and animal health and welfare.   | The Red Meat Profit Partnership | Ongoing. Established June 2017   | Compliance with a unified set of standards across meat processors across a range of sustainability, food-safety and animal welfare issues.  | Farmers via meat processors |
| <b>Sheep and Beef Farm Survey</b>           | Annual survey of 500 beef and sheep farmers to gather economic and production information.   | Beef+Lamb NZ                    | Annual                           | Detailed information about on farm economics and production.  | Direct survey data          |
| <b>Dairybase</b>                            | Central database for financial and production data for the dairy sector.<br><br>~3000 farms involved. Semi-commercial. Farms join voluntarily for commercial benchmarking. Data is anonymised and standardised to produce a sample that is representative of the wider industry. | DairyNZ                         | Ongoing. Data collected annually | Indicators can be derived from the wide range of financial and production statistics collected at a farm level<br><br>Operating profit/ha, working expenses/kgMS, return on assets, return on equity, growth in equity, discretionary cash<br><br>Cow efficiency (MS/liveweight), Pasture eaten, energy eaten, total supplements used (kg DM/cow) | Participating dairy farmers |

# Industry projects (continued)

| Project name                                       | Project description  | Lead agency / person                              | Project status | Indicator data collected   | Data sources                |
|--|--|---|----------------|--|-----------------------------|
| <b>Dairy Industry Good Animal Database (DIGAD)</b> | <p>Database of genetic information on dairy herd.</p> <p>Data collected at cow/herd level and can be aggregated to industry level.</p> <p>Data provided by famers seeking commercial services. Dairy NZ can do industry-good work with the data at a sector level.</p> | Dairy NZ (migrated from LIC)                      | Ongoing        | Animal genetic performance across a range of traits, productivity, fertility, longevity, emissions | Participating dairy farmers |
| <b>Sustainable Milk Plans</b>                      | <p>Action plans at the farm level for minimising environmental impact, particularly on waterways.</p> <p>Plans are aggregated at the catchment level to describe expected future changes from mitigating actions planned.</p>  | Milk processors (principally Fonterra) & Dairy NZ | Ongoing        | N/A – describes activities but does not collect indicator data                                     | Participating dairy farmers |

# Science-led projects

| Project name  | Project description   | Lead agency / person   | Project status | Indicator data collected  | Data sources  |
|---|---|--|----------------|---|---|
| <b>Wheel of water programme</b>   | <p>The Wheel of Water is a 6-year government-funded research of collaborative decision making for setting water quality and quantity limits in New Zealand. The project supports integrated decision making and processes that take into account environmental, economic, social and cultural implications at the catchment scale.</p> <p>The programme has developed a Waterwheel diagram used to illustrate different values held about water use and indicators of the state of each. More information can be found at:</p> <p><a href="https://wheelofwater.wordpress.com/">https://wheelofwater.wordpress.com/</a></p> | <p>Aqualink – John Bright</p> <p>With Landcare and AgResearch</p>            | Ongoing        | <p>Describes indicators across five categories of water use: economic, recreation, ecosystem, drinking water, fishing and cultural.</p> <p>A 2012 paper covered indicators in depth: <i>Effective indicators for freshwater management: attributes and frameworks for development</i>. A model of the effects of limit setting is in development.</p> | <p>Working with collaborative limit setting groups in Takaka (Tasman) and Ruamahanga (Greater Wellington)</p> |
| <b>Wine Dashboard</b>   | Development of sustainability indicators in the wine industry.  | New Zealand Sustainability Dashboard – Andrew Barber                         | Ongoing        | Energy, water and agricultural use on farm  | Sustainable Winegrowing members   |
| <b>Kiwifruit Dashboard</b>  | Development of sustainability indicators for the kiwifruit industry and creation of a bespoke online assessment system.   | New Zealand Sustainability Dashboard – Jayson Benge (The Agribusiness Group) | Ongoing        | Orchard level – energy and water use, waste, community donations. Can be aggregated to industry level   | Participating orchards  |
| <b>Kohura – A sustainability dashboard for Māori collectively owned asset holders</b> | Development of a multi-tiered comprehensive sustainability indicator framework grounded in kaupapa Māori but generalizable across multi sectors and industries. Provides full sustainability assessments of Māori corporate dairy and sheep and beef farming operations. Centred with Ngāi Tahu. Assessments are based on primarily practice-based indicators and a limited suite of key performance indicators.  | New Zealand Sustainability Dashboard – John Reid                             | Ongoing        | Multi layered – from farm level to organisational governance level  | Various Māori organisations including Te Rūnanga o Ngāi Tahu, Ngāti Awa and the office of the Māori Trustee   |

# Science-led projects (continued)

| Project name  | Project description   | Lead agency / person   | Project status | Indicator data collected   | Data sources |
|---|---|--|----------------|--|--------------|
| <b>DELV</b>   | Linked to the Kohura project but with broader applications. A cloud-based framework to facilitate the capture and storage of sustainability indicator data within an organisation, catchment, or industry. Also confronting issues around the aggregation and communication of sustainability data. | New Zealand Sustainability Dashboard – John Reid                                 | Ongoing        | Flexible – from on farm data to Corporate Social Responsibility type reporting |              |
| <b>Biodiversity Indicator Development</b>   | Development and testing of biodiversity indicators. Linked to similar international initiatives with Cool Farm.   | New Zealand Sustainability Dashboard – Catriona Macleod (Landcare Research)      | Ongoing        | On farm  |              |
| <b>Data scales and aggregation</b>  | Simulation study to investigate issues around making reliable inferences from sustainability data. Investigating aggregation issues and power to detect change in sustainability indicators.  | New Zealand Sustainability Dashboard – Andrew Gromley (Landcare Research)        | Ongoing        | Simulated data   |              |
| <b>Network mapping of indicators and identification of high priority indicators</b> | Producing network maps of multiple domestic and international sustainability assessment frameworks to develop an understanding of the saliency of certain indicators.   | New Zealand Sustainability Dashboard – Jay Whitehead (AERU – Lincoln University) | Ongoing        | Existing indicator frameworks  |              |
| <b>New Zealand National Dashboard</b>   | Development of a national dashboard reporting on a small range of cross industry sustainability indicators.   | New Zealand Sustainability Dashboard – Jay Whitehead (AERU – Lincoln University) | Ongoing        | In progress  |              |

# Science-led projects (continued)

| Project name  | Project description   | Lead agency / person  | Project status                                    | Indicator data collected   | Data sources                                  |
|---|---|---|---|--|---|
| <b>Interactive indicator dashboard development</b>                      | Development of online interactive dashboards to report assessments of sustainability indicators. Occurring in conjunction with multiple sustainability indicator development work streams to ensure compatibility.  | New Zealand Sustainability Dashboard – Jay Whitehead, Andrew Barber, Jayson Bengé, Aaron Rimmer, John Reid<br><br>(Multiple agencies) | Ongoing   | Industry Level Data  |   |
| <b>Target setting and differentiation for sustainability indicators</b> | Investigating the implications of setting sustainability indicator targets at different levels for different farmers based on external and internal contextual factors.   | New Zealand Sustainability Dashboard – Jay Whitehead  | Ongoing   |  |   |
| <b>Towards Sustainable and Resilient Agriculture (TSARA)</b>            | This is a case study of New Zealand indicators for the broader TSARA project run out of Europe. The project examined the feasibility of developing a typology of New Zealand farming activity and linking it to meaningful indicators for tracking progress towards agriculture related Sustainable Development Goals. The wider project aims to use the case studies to inform their model for developing pathways to achieving the Sustainable Development Goals. | PwC (on behalf of Our Land and Water NSC and AgResearch)<br><br>Bill Kaye-Blake   | Case study completed<br><br>Wider project ongoing | In progress  | Multiple                                      |
| <b>TempAg – Testing indicators of resilience for rural communities</b>  | This study investigated the feasibility of using official statistics for the purpose of measuring resilience, and tested the possibility of identifying resilience thresholds for particular indicators. The study used community workshops to investigate the drivers of self-reported resilience among residents of four rural communities in New Zealand, and then compared the self-reported ratings against indicators from official data sources.             | PwC (on behalf of Our Land and Water NSC and AgResearch)<br><br>Bill Kaye-Blake   | Stage 1 completed.<br>Stage 2 in planning phase.  | Social, economic, cultural, institutional indicators at the Ward scale for four towns. Environmental data at the regional scale for two regions. | Statistics NZ<br>Ministry for the Environment |

# Science-led projects (continued)

| Project name  | Project description   | Lead agency / person  | Project status                                   | Indicator data collected   | Data sources |
|---|---|---|--|--|--------------|
| <b>Climate change impacts on land use suitability</b> | This project is looking at the climate variables most impacting the land use suitability for key primary sectors (arable, pastoral farming and horticulture). It aims to develop spatial information based on relevant indicators for future changes in both productivity and impacts on receiving environments.  | Landcare Research (on behalf of Deep South NSC)                         | Project initiated in March 2017. Ends June 2019. | Development of indicators for production and environment impacts (nitrate leaching and sediment loss) changing with climate    |              |
| <b>Ecosystem services status and trends</b>           | This project was an MBIE-funded programme 2009-2013 that has now been incorporated into Landcare Research's core funding. The result of the project was a series of spatial maps of ecosystem services indicators for water regulation, erosion control, climate regulation, food provision and habitat provision. The information is now being used to test if they can be incorporated into a System of Environmental Economics Accounting. | Landcare Research   | Ongoing  | Ecosystem services indicators for water regulation, erosion control, climate regulation, food provision and habitat provision. |              |
| <b>PFR Land use suitability</b>                       | This project is looking at defining the concept of land use suitability and testing the approach with a spatial framework   | Plant and Food Research (aligned funding to OLV NSC), Landcare Research | Project started Jan 2017                         | Development of indicators for crop suitability, ecosystem services, landscape and soil functions                               |              |

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## ***Appendix A: List of agencies involved in stocktake***

The following agencies were invited to contribute to the stocktake:

- Ministry for Primary Industries
- Ministry for the Environment
- Lincoln University
- AgResearch
- Landcare Research
- The Sustainability Dashboard
- Beef+Lamb New Zealand
- Dairy New Zealand.

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## ***Restrictions and disclaimers***

This report has been prepared solely for the purposes stated herein and should not be relied upon for any other purpose. We accept no liability to any party should it be used for any purpose other than that for which it was prepared.

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The statements and opinions expressed herein have been made in good faith, and on the basis that all information relied upon is true and accurate in all material respects, and not misleading by reason of omission or otherwise.

The statements and opinions expressed in this report are based on information available as at the date of the report.

We reserve the right, but will be under no obligation, to review or amend our report, if any additional information, which was in existence on the date of this report was not brought to our attention, or subsequently comes to light.

This report is issued pursuant to the terms and conditions set out in our contract with the Our Land and Water National Science Challenge (via AgResearch) received 4 July 2017.