# 2019-B-05658 Delivering the level of applied environmental research needed to support the Government's sustainable land use and freshwater objectives

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| Date Submitted | 11 September 2019 | MBIE Tracking #: 0796 19-20<br>MfE Tracking #: 2019-B-05658<br>MPI Tracking #: B19-0474 |
| Security Level | UNCLASSIFIED - low | Priority: Non-Urgent<br>Long-term issue |

| | **Action sought:** | **Response by:** |
|---|---|---|
| To Hon Dr Megan Woods, Minister of Research, Science & Innovation<br>To Hon David Parker, Minister for the Environment,<br>To Hon Damien O'Connor, Minister of Agriculture | **Note** this brief and existing initiatives and new opportunities to increase support for applied environmental research | 30 September 2019 |
| CC Hon James Shaw, Minister for Climate Change<br>CC Hon Eugenie Sage, Minister of Conservation | | |

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| Actions for Minister's Office Staff | **Return** the signed briefing to MBIE, MfE and MPI |
| Number of appendices and attachments 2 | Titles of appendices and attachments (i.e. separate attached documents):<br>1. Current funding mechanisms<br>2. Components and applied research needs of the Essential Freshwater package |



## Department contacts

| Position | Name | Cell phone | 1st contact |
|---|---|---|---|
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## Purpose

1. This noting brief outlines the essential role of applied environmental research in meeting the Government's objectives for sustainable land use and freshwater management. It discusses issues affecting the delivery of applied research and outlines work currently underway that will help align and increase the delivery of and impact from applied research.
2. This brief also identifies opportunities for the Minister of Research, Science and Innovation, the Minister for the Environment, and the Minister of Agriculture to increase support for applied research for sustainable land use and freshwater management.

## Key Messages

3. Applied research is aimed at finding practical solutions for immediate, real-world problems.

4. Representatives from local government, Māori organisations, and agricultural and land-use sectors have contacted government agencies regarding the difficulties they face in accessing (and co-investing in) applied research to inform decision making in land use change and freshwater management.

5. 34% of research and development (R&D) investment by government organisations (mostly Crown Research Institutes (CRIs)) is for environmental outcomes. This research creates real-world impact and partly meets operational needs. In some areas, the research is relatively well resourced and aligned (e.g. climate change mitigation). However, there is a persistent gap in funding for applied research in areas such as land use change, freshwater, and climate change adaptation.

6. A number of current pieces of work should help to increase the delivery of and impact from applied research for land use change and freshwater. These include: Government's goal to increase R&D investment to 2% of GDP by 2027; increased investment in Overseer and land use decision tools as part of Government's Sustainable Land Use Package; and flow on benefits from MBIE surge funding for kauri dieback and myrtle rust research.

7. There are also some upcoming opportunities that the Minister of Research, Science and Innovation, the Minister for the Environment, and the Minister of Agriculture could use to increase support for applied research for sustainable land use and freshwater management. These include the Primary Sector Science Impact (PSSI) work, the evaluation of Envirolink [redacted]

8. All initiatives will be underpinned by joint-agency work to provide greater detail on the scope and depth of the applied research gap at a system and sector level, including spend by regional councils.

## Applied research underpins evidence-based policy/decision making

10. The science system in New Zealand is designed to support excellent science with a strong line of sight to impacts. To ensure this, the government aims to achieve balance across three equally important *horizons* within its science investment portfolio:

    Horizon One: generating new ideas;

    Horizon Two: developing emerging ideas; and

    Horizon Three: leveraging proven ideas.

11. Applied research mainly takes place at horizon three, though it can also occur at horizon two. Applied research is aimed at finding practical solutions for immediate, real world problems, and its impacts are often predictable and near-term compared with research in horizons one and two. Government has a role to play in ensuring:

    a. the science and innovation system enables adequate applied research, and that research is accessible to users;

    b. public investment and co-investment is at the right level and scope, including being aligned, focused, and able to achieve impact; and

    c. private investment is enabled at the closer-to-market end.

12. Examples of applied environmental research include[1]:

    a. **integrative and systems research** to provide information on the entirety of the environment (e.g. catchment modelling) to help land owners and decision makers (e.g. regional councils, farm managers) navigate complexity and manage multiple drivers;

    b. **translation/extension/commercialisation research** to put findings from existing research into practice and make outputs accessible to resource managers, land owners, and decision makers in a useable form;

    c. **Social science** to provide information on public perceptions or values in relation to key issues and possible policy interventions; and

    d. **Mātauranga Māori** to ensure Māori knowledge systems meaningfully inform policy and land use/freshwater decisions.

## Government invests in applied research through a variety of mechanisms…

13. Government funding for applied environmental research is in part delivered by the following funds (described in detail in Appendix 1):

    *Land use and freshwater*

    a. MfE's Water Science and Economic Fund ($1.5m pa) funds water science, economic impact analysis, and guidance to support development of the National Objectives Framework.

    b. MfE and MPI work with science providers and resource managers to support the development and testing of best practice methods in sustainable land use and freshwater management (>$10m pa from MfE and MPI).

[1] While basic data collection, monitoring, and data sets provide important information to support policy and decision-making (e.g. monitoring ecological indicators, soil information to support farm plans), these are outside the scope of this briefing.

c. MBIE's Envirolink ($1.6m pa) funds the transfer/uptake of scientific environmental information to eligible Regional Councils and unitary authorities. It is driven by Council demand.

*Climate change and other aligned funding*

d. MPI administers $8.5m pa for the Global Research Alliance on Agricultural Greenhouse Gases (currently only funded to 2019/20); $4.85 m pa for the New Zealand Agriculture Greenhouse Gas Research Centre (NZAGRC); $2.8 m pa for Sustainable Land Management and Climate Change Research; and $1.85 m pa for Greenhouse Gas Inventory research.

e. MBIE is providing an additional $4.8m pa for 4 years to support the NZAGRC from the Strategic Science Investment Fund (SSIF) and $2.3 m pa (until August 2021) for the Pastoral Greenhouse Gas Research Consortium.

f. Several MBIE funds can support applied research by providing underpinning and/or potentially transformative research, mostly in horizons one and two. These include the SSIF, the National Science Challenges (NSCs), and the Endeavour Fund.

14. While MfE and MPI invest in applied research, the amount of funding is not sufficient to address the need for applied research to support evidence-based policy and decision making, particularly for the complex areas of land use change and freshwater.

## …but additional funding will be required to help deliver Government priorities

15. There is a growing need for applied environmental research, given the Government's goals around sustainable land use and freshwater management and the policy changes resulting from those goals. Further, there is increasing expectation from the public and consumers of New Zealand products to demonstrate transparency and evidence around environmental management and protection.

16. An increase in applied environmental research will be required to help deliver the Government's priorities for a sustainable, productive, and inclusive economy. It will be particularly important in:

    a. developing and implementing regulatory changes in the areas of sustainable land use and freshwater management (as an example, Appendix 2 contains a description of the applied research needed to help support the Essential Freshwater Package);

    b. supporting councils' ability to successfully establish reasonable environmental limits and levels of resource use; and

    c. mitigating unnecessary costs and disruption to three-water infrastructure operators and land managers.

17. A number of representatives from local government, Māori, science providers, and industry have expressed concern over the limited funding for the applied research required to deliver Government's environmental and agricultural work programmes. Key concerns include:

    a. Local Government New Zealand (LGNZ) has written to MfE, requesting that applied research be a priority for implementing the upcoming Essential Freshwater package (COR7623, 26 April 2019).

    b. The Kahui Wai Māori report has recommended the implementation of a National Freshwater Science Strategy that is informed by Māori measures of health to underpin Te Mana o te Wai.

c. CRIs are generally the largest recipients of MBIE Endeavour funding. However, AgResearch and Manaaki Whenua Landcare Research have noted that their recent applied research proposals have not been funded through Endeavour, as they are not well-aligned with Endeavour's focus on 'stretchy'/innovative research. These are often proposals that would directly meet departmental and councils' needs (e.g. relating to water quality or social science).

## Government's investment in applied research could be better aligned and leveraged for impact

18. In 2018, government organisations invested significantly in research with environmental or primary industry outcomes. At $260m and $275m respectively, this represented 68% of total R&D spend from government organisations[2]. However, not enough of that research was at the applied end of the pipeline to meet the growing need.

19. Although government invests significant funding in excellent environmental research, there is an opportunity to increase funding for applied research that meets farmers, regional council, policy-makers, and cross-government operational needs for land use and freshwater. Doing so would increase the impact derived from existing investments and also make progress towards the 2% target.

20. Recent changes to the science system are likely to provide some additional support for applied science for land use and fresh water. These are outlined below:

    a. The Government has committed to increasing total investment in R&D to 2% of GDP by 2027. We recommend that some of this increase is targeted towards applied environmental research.

    b. Under the Agriculture component of the Productive and Sustainable Land Use package, MPI is investing $59.6m over 4 years on improving and trialling Overseer and other on-farm decision tools, and on improving on-farm data and monitoring. This investment will support farmers to move toward more environmentally sustainable and higher value production. It will also improve on-farm environment data to support government regulatory functions and land use and freshwater decision making.

    c. MPI's recently refreshed/enhanced Sustainable Food & Fibre Futures (SFF Futures) provides ~$40m pa for transformative programmes for New Zealand's food and fibre sectors to create more value, develop capability and new practices, and deliver long-lasting economic, social, cultural and environmental benefits.

    d. MBIE's establishment of kauri dieback and myrtle rust surge funding for research will help generate long-term approaches/solutions for combatting these pathogens. The land use and freshwater impacts of this work are likely to come through flow-on benefits.

21. The Research, Science and Innovation (RSI) Strategy that MBIE is currently developing sets the vision for all of New Zealand's publicly-funded research. [redacted]

22. Connectivity across the science system and with end-users will be critical. Increasing funding for applied science to achieve a more balanced portfolio of RSI investments is in

[2] As reported in the Statistics New Zealand R&D Survey. These numbers are self-reported by R&D survey participants.

line with the Strategy, as applied science can quickly and clearly demonstrate impact and is well connected to end-users[3].

23. There are further opportunities to better deliver applied research for land use and freshwater management through the initiatives outlined in the table below.

| Opportunity | Description | Lead agency or Minister for further advice |
|---|---|---|
| Primary Sector Science Impact (PSSI) | The PSSI work programme, which was agreed by the Minister of Research, Science and Innovation, the Minister of Agriculture, and the Minister of Forestry in late 2018, takes a cross-sector approach to improving impact from primary sector science. Within the PSSI work programme, there is scope to align applied research for greater impact, such as: identification of 3-5 critical areas for focus and intensive mission-led research and implementation; the current review of AgResearch; and upcoming work on optimising SSIF investment. | MPI (PSSI)<br>MBIE (AgResearch/SSIF) |
| Envirolink | MBIE has completed an evaluation of the Envirolink fund, which is effective and highly regarded by Regional Councils. MBIE officials will provide further advice to relevant Ministers on that review in due course. The ongoing funding and potential increased funding would be highly beneficial for applied research. | MBIE |
| [redacted] | [redacted] | [redacted] |

24. This package of initiatives will be underpinned by cross-agency work to identify the scope and depth of the applied research gap, including in relation to regional councils.

## Next Steps

25. Officials from MBIE, MfE and MPI will continue to work together on the identified opportunities to increase support for applied environmental research in the areas of land use and freshwater management.

26. We will provide you with further advice in due course [redacted] and next steps in relation to Envirolink.

[3] This is in comparison to the more experimental research that many MBIE funds support, which is also an essential part of a balanced portfolio but the impacts are less certain and can take many years to materialise.

## Recommendations

27. We recommend that you:

a. **Note** that:

i. Regional Councils, land managers, Māori, and central government agencies have identified a need for more applied research to meet requirements related to land use change and freshwater decision making;

[redacted] There are several upcoming opportunities to increase support for applied research to meet these needs, [redacted]

Noted

b. **Agree** that this briefing and appendices will be released proactively on the Ministry for the Environment's website within the next eight weeks.

Agreed/Not Agreed

## Signature

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|---|---|---|
| Martin Workman<br>**Director, MFE** | Fiona Duncan<br>**Director, MPI** | Marcos Pelenur<br>**Manager, MBIE** |
| Hon David Parker<br>**Minister for the Environment**<br>**Date** | Hon Damien O'Connor<br>**Minister of Agriculture**<br><br>**Date** | Hon Dr Megan Woods<br>**Minister of Research, Science & Innovation**<br>**Date** |

## Appendix 1 – Current funding processes

| Fund Title | Purpose (incl. estimated funding level) | Effectiveness for meeting applied science needs |
|---|---|---|
| **Envirolink** | The scheme aims to support regional councils by adapting management tools to local needs, and translating environmental science knowledge into practical advice.<br><br>Envirolink distributes $1.6m annually, of which $1.1m is for advice projects (<$40,000), and $570,000 divided amongst 3-5 projects for tools<br><br>The audience is council planners and engineers. | This is a very effective and moderately efficient process for funding councils' applied research needs.<br><br>The scheme is currently limited to advice and tools, and does not include research or monitoring. The current scope also does not include areas such as hazard research (eg, flood mapping), Mātauranga Māori, and soil mapping.<br><br>There is very strong governance to keep this fund from being oversubscribed, and it makes this process very efficient and effective for councils. |
| **Strategic Science Investment Fund (SSIF)** | SSIF funds strategic investment in research programmes and scientific infrastructure that have long-term beneficial impact on New Zealand's health, economy, environment and society.<br><br>Around $50m pa is invested in the environmental platforms. A further $19m pa is invested in 25 Nationally Significant Collections and Databases which underpin much applied research.<br><br>These platforms have some connections to end-user groups such as councils and central government agencies, but this research is often at a distance from generating tools or detailed advice. | This funding is targeted towards underpinning capability, infrastructure and research in areas of critical, ongoing need for New Zealand. About 1/3 of SSIF-funded research occurs in horizon one, but it generally does not focus on operational council or departmental needs. |
| **Endeavour fund** | The Endeavour Fund is an open, contestable process with a focus on both research excellence and a broad range of impacts. The fund supports research in a wide range of disciplines that will be potentially transformational across economic, environmental and societal objectives. The Fund is also instrumental in giving effect to Vision Mātauranga.<br><br>In 2018/19, $65m, or around 30% of the fund, is invested in projects with environmental outcomes. | This fund does not target applied research. It is focused on excellent, potentially transformational research. Additional funding for Endeavour alone would not help councils or departments as their research needs do not have sufficient innovative stretch.<br><br>Endeavour proposals are assessed for potential impact, connection to end-users, and credible pathways to impact, but the nature and timing of the impacts is often uncertain, as expected for the type of research Endeavour targets. |

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| **The National Science Challenges (NSCs)** | The NSCs are science programmes aimed at some of New Zealand's greatest issues. Of the eleven challenges, six are working on issues that relate to the environment:<br>a. Building Better Homes, Towns and Cities<br>b. New Zealand's Biological Heritage<br>c. Our Land and Water<br>d. Resilience to Nature's Challenges<br>e. Sustainable Seas<br>f. The Deep South<br>Around $40m pa is invested in these environmental challenges. | These challenges are generally working on the issues that councils are concerned about, and are required to connect with users and stakeholders around their issue. However, the research does not entirely meet councils' needs. In particular, the Challenges have only five more years of funding, but councils have research needs well beyond that timeframe. |
| **Water Science & Economic Fund** | This fund is a non-departmental fund of $1.5 million per year that the Ministry for the Environment administers. This is an internal fund to support MfE research, and is not open for other organisations to apply to. This appropriation covers water science, economic impact analysis and guidance to support development of the National Objectives Framework (in the National Policy Statement for Freshwater Management). | This fund does allow for the funding of applied science; however, it is not restricted to applied science. The Water Science and Economics Fund has limited funding ($1.5 million per year) and a limited scope (science, impact analysis and guidance to support the development of the National Objectives Framework). Each year, the fund is oversubscribed with many more research proposals put forward than there is funding for. |
| **Sustainable Food & Fibre Futures (SFF Futures)** | SFF Futures funds around $40m per year of innovative projects that will create more value from the food and fibre industries. Projects could be about developing new products or services, or ideas for creating new jobs, increasing skills and capability, or encouraging better collaboration and information sharing.<br><br>Local and regional government co-funding cannot apply, except for community-driven proposals. | Many of the likely projects under this fund could be for applied research. An increased focus on this would encourage more proposals in the space. |

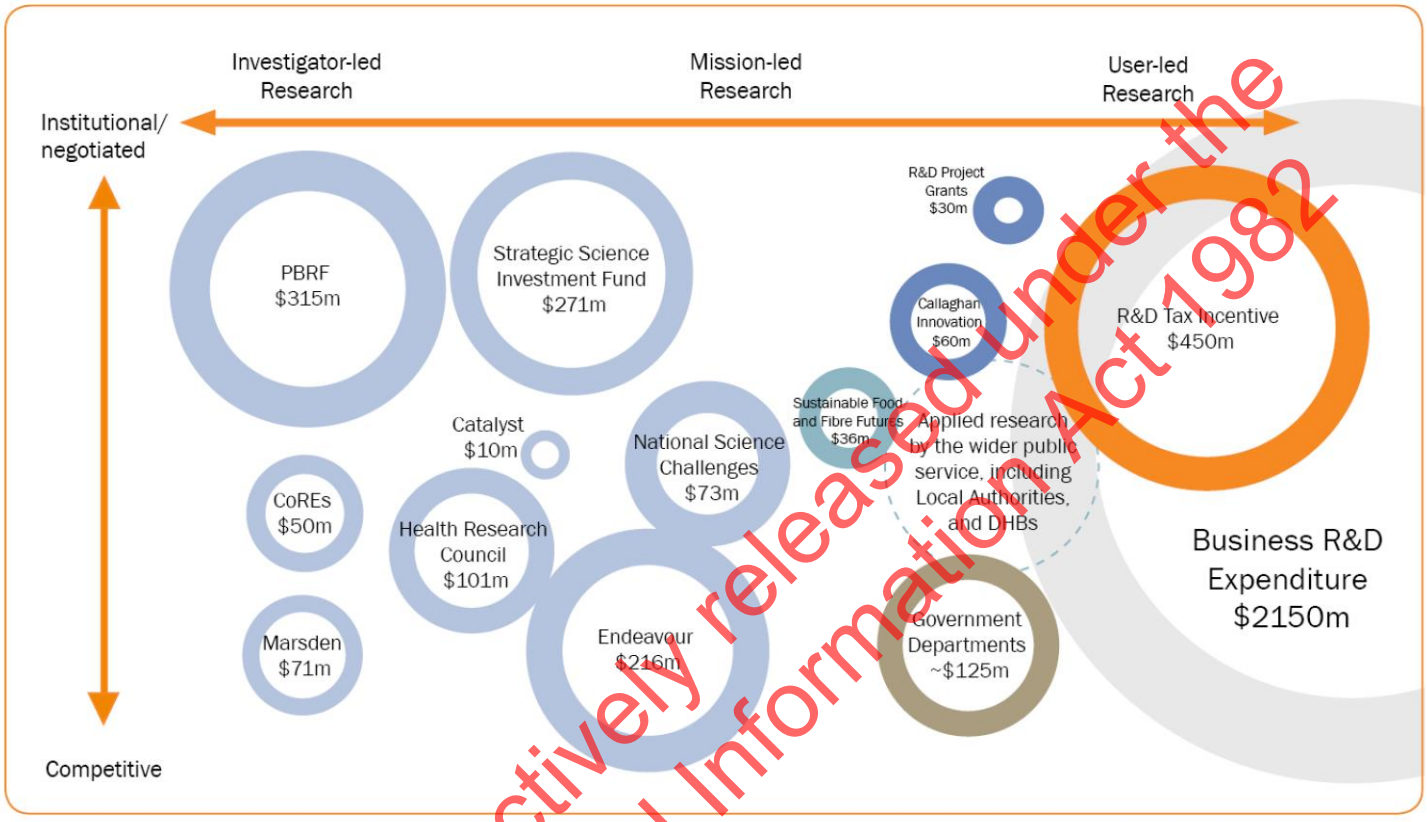


**Figure 1:** The science funding landscape

## Appendix 2 – Components and applied research needs of the Essential Freshwater package

| Component | Description | Applied research needs |
|---|---|---|
| Strengthening the National Policy Statement for Freshwater Management (NPS-FM) | Freshwater quality is maintained and enhanced by a wider range of ecosystem measures:<br>• strengthening Te Mana o te Wai<br>• managing sediment<br>• protecting wetlands<br>• providing greater measures of ecosystem health<br>• managing nutrients<br>• reducing E.coli for swimming<br>• preventing further stream loss. | • Develop measures of ecosystem health<br>• Discriminating E-coli sources<br>• Catchment accounting tools |
| New National Environmental Standards for freshwater | Holding the line on water quality, while farmers move towards continuously improving practice and more sustainable land use.<br>• Set of controls on risky land use practices<br>• Mandatory Farm Environment Plans | • Catchment accounting tools<br>• Land-use modelling<br>• Advice and evaluation of farm management plans<br>• Comprehensive, integrated datasets to support the development of decision-support tools for farmers<br>• Research into future workforce needs and community impacts (including mental health)<br>• Identifying and protecting high value attributes from NZ's unique flora and commercial development of high value food products<br>• Farm system change studies |
| Resource Management Act 1991 proposal for a new, faster process for regional water plan development | • Bring forward councils' implementation of water management plans to ensure they are in place by 2025<br>• New national hearing panel to hear plans and proposals focused on ensuring the proposed changes to the NPS come into effect in a timely way | • National soil map<br>• Investment to target datasets & analysis to inform plan-making processes |

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| Support for councils to set limits and give effect to the NPS and primary sector to implement the package | • Budget 19 support for package implementation<br>• Freshwater Investment Fund forward investment programme<br>• Further central government intervention to support planning process | • Research to understand how limits can reach objectives<br>• Investments in catchment accounting & intervention logic science to provide further information on what's required to achieve water quality outcomes<br>• Research into future landscapes, what will NZ look like in 2050? |
| Initial thinking on a new approach for nitrogen allocation | Beginning a national conversation on why we need a systematic approach to discharge allocation, including an outline of the range of approaches that could be adopted | • Catchment accounting tools ensure nitrogen is allocated within limits<br>• Farm-scale nitrogen leaching estimates to set more accurate limits during consenting processes<br>• Catchment scale attenuation modelling, so that different soils that can absorb more nitrogen are managed differently to those that let through a lot of nitrogen<br>• Market systems to help transfer nitrogen discharge rights between farms in the same catchment. |