From:	no-reply@mbie.govt.nz
To:	Research, Science and Innovation Strategy Secretariat
Subject:	Late submission on draft RSI strategy
Date:	Thursday, 28 November 2019 11:24:29 a.m.
Attachments:	Online-submission-form-uploadsdraft-research-science-and-innovation-strategy-submissionsMBIE-Research-Science-Innovation-Strategy-response-FINAL.pdf

Are you making your submission as an individual, or on behalf of an organisation?
Organisation

Name
Simon Upton

Name of organisation or institutional affiliation
Parliamentary Commissioner for the Environment

Role within organisation
Commissioner for the Environment

Email address (in case we would like to follow up with you further about your submission)
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Ministry of Business Innovation and Employment

Attention: Richard Walley

RSI-Strategy@mbie.govt.nz

26 November 2019

Dear Mr Walley,

I am writing to provide input to the consultation launched by the Ministry for Business, Innovation and Employment (MBIE) on the draft *Research Science and Innovation Strategy* (RSIS), published in September 2019. My comments relate to the Strategy's appropriateness as a basis for providing strategic direction for environmental research in New Zealand. I do not comment on any wider significance the Strategy may have but rather confine myself to research that is relevant to my remit as Parliamentary Commissioner for the Environment.

The Parliamentary Commissioner for the Environment

The Parliamentary Commissioner for the Environment was established under the Environment Act 1986. As an independent Officer of Parliament, the Commissioner has broad powers to investigate environmental concerns and is wholly independent of the government of the day.

Key comments from this submission:

The proposed criteria – excellence, impact and connections – are too generic. These need to be relevant to each research discipline, and values, assessments and priorities set with each science discipline.

The RSIS is focused on novelty and innovation at the frontier, but it is difficult (if not impossible) to effectively undertake novel research without the solid foundational knowledge needed to ground our understanding.

Given New Zealand's reliance on its natural environment for both its economy and people's wellbeing, the required environmental research is critical for improving our understanding of our natural environment.

Departmental operational research is not a substitute for a dedicated fund to underpin monitoring and fundamental research. However, Crown Research Institutes (CRIs) and other agencies need to be funded appropriately to maintain monitoring networks, key

databases, collections and infrastructure that underpin New Zealand's environmental science.

Priority areas listed in the RSIS do not align with priority environmental issues stated in government policy documents and recent reports. The RSIS appears to be developed in isolation from other parts of government.

The proposed framework is too generic

The RSIS attempts to construct generic guiding principles that can apply equally to all research endeavours. Having previously identified excellence and impact as pre-conditions for research endeavours seeking public funding, MBIE is now proposing to add a third criterion – connectivity. While these attributes provide an interesting way of thinking about research, their generality means they are ill-fitted to addressing the needs of different research disciplines. The nature of what constitutes a valued outcome and the timeframes over which it will be valued can be hugely variable between disciplines. It follows, therefore, that the ways to assess the value of research in different scientific fields are also varied, and a single, generic filter of excellence, impact and connectivity, is too simplistic to deliver meaningful results.

In New Zealand, we are only beginning to understand the bio-geochemical systems that maintain our extraordinary natural heritage and our productive systems. Species are still being discovered and described at a high rate: For example, in 2010, 17,135 marine species were identified in a region-wide review, of which 4,315 were known, but undescribed.[1] New Zealand's diverse and distinctive land invertebrate fauna is another example. To date, 22,000 arthropod species have been described. However, at least that number again is still awaiting identification.[2] Further, the 2010 Marine Biodiversity review identified that for many taxonomic groups, one specialist, only, existed nationally[3], demonstrating a concerning lack of depth in our science workforce.[4]

Our understanding of how species interact in ecosystems is still very poorly developed, as is our knowledge of human impacts on the biosphere.[5] Our ability to halt the decline of our threatened fauna is challenged by lack of understanding of the species' biology, their interdependencies, and how human activities influence their survival.[6] The RSIS fails to provide information on how research will be targeted to address environmental pressures, and how New Zealand will manage the sustainability of key infrastructure and science capability.

[1] Gordon et al., 2010. *Marine Biodiversity of Aotearoa New Zealand*. PloS ONE.
[2] Goldson et al., 2015. *New Zealand pest management: Current and future challenges*. Journal of the Royal Society of New Zealand.
See also Manaaki Whenua-Landcare Research website: Invertebrate Systematics.
[3] Gordon et al., 2010. *Marine Biodiversity of Aotearoa New Zealand*. PloS ONE.
[4] Royal Society of New Zealand, 2015. *National Taxonomic Collections in New Zealand*.
[5] Ministry for the Environment, 2019. *Environment Aotearoa* 2019.
[6] Hare et al., 2019. *Intractable: species in New Zealand that continue to decline despite conservation efforts.* Journal of the Royal Society of New Zealand.
See also Ministry for the Environment, 2019. *Our Marine Environment 2019.*

In my most recent report I detailed how this patchy knowledge is detrimental to New Zealand's ability to appropriately manage its environmental obligations.[7] This poor understanding is set against the backdrop of a rapidly changing environment due to climate change.

The New Zealand economy relies overwhelmingly on natural systems to sustain agriculture, fishing, forestry and tourism, which make up most of our export earnings.[8] The identity of New Zealanders is inextricably tied up with a sense of this place and our relationships with the natural environment – something marketers are quick to exploit in selling New Zealand products abroad. Unarguably, the state of New Zealand's natural environment is integral to our national wellbeing, and our kaitiakitanga (stewardship) needs to be based on a strong knowledge base.[9] This knowledge base should integrate mātauranga Māori (see below).

The proposed RSIS is not fit for purpose in the environment sector

The focus of the RSIS on science 'at the frontier' or 'behind the frontier' is not aligned with the priorities for environmental research, which have been articulated in recent strategy documents (such as the *Conservation and Environment Science Roadmap* and the *Primary Sector Science Roadmap*).[10] Further, the recent state of the environment report, *Environment Aotearoa 2019,* published by the Ministry for the Environment (MfE) and Stats NZ earlier this year, listed nine priority environmental issues for New Zealand as a nation.[11] The RSIS does not reference these. The required research is critical to improving our understanding of New Zealand's biophysical setting. It shouldn't have to be dressed up as either novel or 'at the frontier' to be noticed. While novelty and innovation may be crowd pleasers, it is difficult (if not impossible) to effectively undertake novel research without the solid foundational knowledge needed to ground our understanding. These points are made in the submissions from the National Institute of Water and Atmospheric Research (NIWA), Manaaki Whenua-Landcare Research and MfE. These are important submissions that should be taken very seriously.

Research funded without reference to the particular subject matter of the environment will not serve to address some of New Zealand's most pressing issues. Framing the future scope of environmental research should start by examining the pressures and impacts on our environment (along the lines of the international accepted drivers-pressure-state-impact-response (DPSIR) framework). By way of illustration environmental research categorised around pressures [12] could identify major themes, such as:

- Ecosystem health and status compared to historical baselines
- Loss of biodiversity, including taonga species

[7] PCE, 2019. *Focusing Aotearoa New Zealand's environmental reporting system.*
[8] Data to March 2018 show that agriculture makes up 4.7% of the Gross Domestic Product (GDP), forestry makes up 0.7 of GDP, fishing and aquaculture makes up 0.9% of GDP, and tourism makes up 6.1% of GDP. Stats NZ, 2019. *Tourism satellite account:2018*. Accessed 21/11/2019. Data to March 2018.
Stats NZ, 2019. *National accounts: 2018*. Accessed 21/11/2019. Data to March 2018.
[9] Treasury, 2019. *Living Standards Framework: Introducing the Dashboard*. Accessed 19/11/2019.
[10] Department of Conservation and Ministry for the Environment, 2017. *Conservation and Environment Science Roadmap;* Ministry for Primary Industries, 2017. *Primary Sector Science Roadmap.*
[11] Ministry for the Environment, 2019. *Environment Aotearoa 2019,* p.9.
[12] Department of Conservation and Ministry for the Environment, 2017. *Conservation and Environment Science Roadmap*; Ministry for the Environment, 2019. *Environment Aotearoa 2019.*

- Current and future biosecurity threats
- Climate adaptation
- Sociological responses to pressures and impacts.

It is impossible to understand environmental impacts if important data informing us about pressures and states (and prior states) is missing. The RSIS is silent about the fact that much-needed New Zealand research to underpin data analyses is often missing, which in turn hinders future research reliant on those data. Research into biophysical processes requires deliberate and systematic investment over extended time periods, as pointed out by MfE and NIWA in their submissions on this proposal. MfE states, *"In order to appropriate, curate and steward foundational infrastructure, funding is also required to ensure the physical infrastructure and capability, as well as ongoing scientific research to ensure usefulness in perpetuity".*[13]

I should like to be clear that I am *not* making the case here for departmental operational research – that which is carried out by government agencies in the course of performing their daily management and regulatory functions. Research to improve system understanding is not operational research, even if its ultimate application may be to assess management or mitigation options. In terms of the DPSIR framework, the tracking of *response* most clearly fits under the operational research funding label.

Measuring research impact

Knowing when or how we will use research findings about the nature of environmental processes can make the attribution of research impact challenging. The RSIS argues for a 'line of sight' to impact. The shakiness of this idea becomes apparent on p.28 where its desirability is qualified in these terms: "..even if the outcomes of more basic or high-risk research cannot be predicted, we need to be able to demonstrate its contribution – even if attribution is imprecise *or we do so after the research is completed* [my emphasis]."

The passage emphasised suggests that many bids for environmental research funding involving understanding multi-decadal change could be justified with the simple statement that "the impact of attribution will be demonstrated after the research is complete". This would be correct and also vacuous.

To interpret environmental pressures and impacts, we need to understand the functioning of biophysical systems prior to their being disrupted. Time dimensions can be protracted. Research impacts, in research disciplines, will rarely be detected within time frames of less than three to nine years.[14] We also need to be able to assess the effectiveness of any measures that have been implemented in response to environmental perturbations.

Rather than trying to shoe-horn everything into a declaration of research impact, it would be much better to use concepts that are meaningful in an environmental setting. I consider that the impact of research is considered in too narrow a context in the current proposal. Reviewing the value of environmental research becomes a matter of assessing research contribution to better defining

[13] Ministry for the Environment, 2019. *MfE's feedback on the draft Research, Science & Innovation Strategy*, p.4.
[14] King's College London and Digital Science, 2015. *The nature, scale and beneficiaries of research impact. An initial analysis of Research Excellence Framework 2014 impact case studies*.

pressures, states and processes in a way that can assist appropriate responses to environmental challenges.

MBIE should not be afraid to address different fields of research in different ways. I am sure that similar specificity of need exists across most research disciplines. Funding should be assessed in each field separately, with specific objectives and measures of value for each, defined in consultation with leading players in each field. Examples already exist in New Zealand science funding structures (e.g. Mardsen Fund Panels, the Health Research Council). Many similar nations that are part of the Organisation for Economic Co-operation and Development (OECD) use specialist research councils to allocate research funding.

Integrating mātauranga Māori into research

Not unique to the environmental research discipline, but perhaps most strongly applicable, is the knowledge base of mātauranga Māori.[15] This has been generated and transmitted orally over many generations since the first Polynesians arrived in Aotearoa. The accumulated knowledge represents sustained and often extremely subtle observations. In the same way that Māori regard themselves as connected to and a part of the land, the knowledge that has been accumulated is often strongly related to place. It is the knowledge base that enabled Māori to manage their areas and sustainably use resources. That knowledge would have been hard-won from the experience of settling and having to learn to live in a previously uninhabited land.

For the 600-odd years before the arrival of Europeans, mātauranga Māori represents the only human record we have of the environment of these islands and their surrounding waters. For that reason alone, it is of immense importance. And it can be of highly practical contemporary importance. Greater clarity is needed in MBIE's RSIS on how mātauranga Māori will be integrated into future research, especially in the environmental research area. A strong focus on creating career pathways for Māori participants in science, from early career, secondary education or earlier, is likely to be needed to boost participation and engagement.

In closing, let me thank you for allowing a late submission. The coincidence of the RSIS's appearance with the publication of my own investigation into environmental reporting is fortuitous; it has enabled me to reflect on the importance of environmental research to the way we report on key environmental challenges. As a result, I am now considering a review in the coming year of the funding and prioritisation of environmental research in New Zealand.

My colleagues and I would be happy to discuss with you any matters arising from this submission.

Yours sincerely

Simon Upton

Parliamentary Commissioner for the Environment

[15] PCE, 2019. *Focusing Aotearoa New Zealand's environmental reporting system.*