Te Uru Kahika Regional and Unitary Councils Aotearoa

16 March 2022

Sent via email to: FuturePathways@mbie.govt.nz

To whom it may concern

Please find following a submission by Te Uru Kahika – Regional and Unitary Councils Aotearoa on the future of New Zealand's Research, Science and Innovation (RSI) system as laid out in the Te Ara Paerangi Future Pathways Green Paper.

The sector looks forward to ongoing dialogue with the Ministry on this very important topic area. As a sector Te Uru Kahika is both a provider and consumer of science and we are deeply committed to the success of any reform.

Please note the contact address for the submission is Dr Chris Daughney, Te Uru Kahika's Chief Science Adviser.

Nāku iti noa, nā

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Te Uru Kahika Regional and Unitary Councils Aotearoa

SUBMISSION ON TE ARA PAERANGI FUTURE PATHWAYS GREEN PAPER

Date: 16 March 2022

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Te Uru Kahika welcomes this consultation on the future of New Zealand's Research, Science and Innovation (RSI) system as laid out in the Te Ara Paerangi Future Pathways Green Paper.

Our submission is summarised on the following page, with points covered in more detail in the remainder of this document.

OUR SUBMISSION AT A GLANCE

TE URU KAHIKA – REGIONAL AND UNITARY AUTHORITIES AOTEAROA

- New Zealand's 16 regional and unitary authorities are major producers and end-users of science. We are a key cog in the nation's Research, Science and Innovation (RSI) system.
- In this submission on MBIE's Te Ara Paerangi Future Pathways Green Paper, we acknowledge that parts of our RSI system work well, but some areas need improvement.
- We seek to be involved and contribute to the next stages of the Te Ara Paerangi consultation.

RESEARCH PRIORITIES

- We support development of a set of national research priorities, but agreed underpinning principles must be jointly developed before any priorities are set.
- The relative importance of national research priorities may vary from place to place, so delivery on them will require well-coordinated effort from within and outside the RSI system.

FUNDING

- Increased funding is needed for long-term applied environmental research.
- Mechanisms for environmental and human health research should be better linked.
- Funding is needed for knowledge transfer as well as knowledge creation.
- Funding will deliver greater value for the nation if the RSI system becomes more efficient, open and accountable.

TE TIRITI, MĀTAURANGA MĀORI, AND MĀORI ASPIRATIONS

- We support a shift to a Tiriti-based RSI system, which may look very different to the present and take time to design and implement.
- We support nearer-term modifications to the RSI system to increase engagement of and outcomes for Māori.

INSTITUTIONS

- We recognise the valuable contributions being made by New Zealand's research institutions.
- Where there is a need to improve the performance of research institutes, we encourage consideration of a range of approaches, such as those laid out in this submission.

RESEARCH WORKFORCE

- There are crucial shortcomings in the science graduate cohorts that are coming through New Zealand's education system.
- There is also a critical lack of industry training and professional development opportunities for New Zealand's science workforce.
- We recommend that New Zealand's RSI system should expand its mechanisms and support for the training and professional development of scientists.

INFRASTRUCTURE

- Investment in RSI infrastructure should be planned and sustainable, and access to it should be coordinated and collaborative.
- State-of-the-environment monitoring and reporting are crucial activities that need to be better supported in the RSI system.
- We strongly recommend that the RSI system should support a comprehensive national environmental reporting system, with aligned funding to support the data requirements, standards, process understanding, and time scales associated with this reporting.

INTRODUCTION

Te Uru Kahika welcomes this consultation on the future of New Zealand's Research, Science and Innovation (RSI) system as laid out in the Te Ara Paerangi Future Pathways Green Paper.

TE URU KAHIKA IS THE NEWLY ESTABLISHED IDENTITY FOR THE COLLECTIVE EFFORTS OF NEW ZEALAND'S REGIONAL SECTOR

The 16 regional councils and unitary authorities comprising the regional sector have responsibilities for integrated management of land, air and water resources, supporting biodiversity and biosecurity, providing for regional transport services, and building more resilient communities in the face of climate change and natural hazards. The name Te Uru Kahika reflects the work and vision of the regional sector: *thriving environments and thriving communities*.

- **The regional sector is a major producer of science within the wider RSI system.**

  The 16 regional authorities have combined science expenditure of over $70 million every year[1] and collectively employ hundreds of scientists, including dozens of PhDs. Science undertaken by the regional sector delivers detailed, local-scale knowledge of the catchments that they work in and generates much of New Zealand's vital state-of-the-environment monitoring data[2]. For decades, the regional sector's network of science Special Interest Groups (SIGs)[3] has facilitated collaboration and leverage of research investments across the country. As a crucial cog in New Zealand's RSI system, regional authorities have expertise in working at the science-policy interface, and determining how best to implement research to deliver environmental and community outcomes.

- **The regional sector is also a key collaborator, integrator and user of science produced by other parts of New Zealand's RSI system.**

  Regional sector scientists play an integrating role and collaborate extensively on research programmes led by Crown Research Institutes (CRIs), Independent Research Organisations (IROs) and universities. The regional sector also commissions such organisations to undertake research and consultancy projects on a wide range of topics. The regional sector provides guidance on research needs to the wider RSI system through its overarching science strategy[4] and SIG science strategies[5].

[1] https://www.pce.parliament.nz/publications/environmental-research-funding-review, see page 33.
[2] For example, see Land Air Water Aotearoa, www.lawa.org.nz and regional authorities' environmental reports
[3] https://www.envirolink.govt.nz/assets/Reg-SIG-Network-Sructure-Chart-May-2021.pdf
[4] https://www.envirolink.govt.nz/assets/Research-for-Resource-Management-2020.pdf
[5] See https://www.envirolink.govt.nz/research-strategy/

NEW ZEALAND'S CURRENT RSI SYSTEM

As we describe below, some parts of the current RSI system work well but there are areas that need improvement. Appropriate changes in the RSI system could make a big difference to the effectiveness of science funding. However, changes must be implemented carefully to avoid unhelpful disruptions to the RSI system.

SOME PARTS OF OUR RSI SYSTEM ARE WORKING WELL

- **New Zealand's RSI system is producing some excellent science in areas of importance to the nation.**

  These include understanding climate change, freshwater and marine resources, and biodiversity and biosecurity, and also investigating approaches that can be taken to mitigate and adapt to the impacts of key issues on our environments and communities. Much of the environmental science produced by our RSI system is internationally top-notch, while also being produced cost-effectively (e.g. as shown by a high number of publications produced per dollar invested).

- **New Zealand's RSI system also supports some good collaborations that contribute significantly to its overall performance.**

  Key for Te Uru Kahika are the collaborations between regional sector scientists and the wider RSI system, as have in certain instances been fostered through stable, long-term funding mechanisms such as the National Science Challenges (NSCs) or the Strategic Science Investment Funding (SSIF) received by CRIs and IROs.

- **Emphasis on building relationships between scientists and science end-users is a strength in some parts of New Zealand's RSI system.**

  As noted above, the regional sector undertakes a dual role as a producer and a user of science. For both roles, the collaborations between end-users across the country and scientists across the RSI system are absolutely vital for efficient uptake and application of research. The Envirolink programme ($1.6m per year) has been a key success that has enabled the regional sector to rapidly and cost-effectively take up and apply science knowledge produced elsewhere in the RSI system. Inclusion of pathways to implementation in the Endeavour Fund is also seen as valuable.

- **Emphasis on mātauranga and Te Ao Māori is a growing strength of New Zealand's RSI system.**

  Te Uru Kahika recognises these as complementary knowledge systems which can and do contribute significantly to outcome benefits for the nation. Strong engagement of mana whenua within the RSI system is vital; Māori involvement in co-leadership of NSCs is an example of how such relationships can work well.

SOME PARTS OF OUR RSI SYSTEM NEED IMPROVEMENT

The Regional Sector's Resource Managers Group (RMG) conducted a review of New Zealand's RSI system in 2019 in response to discussion that it was not serving regional authorities as well as it used to. The consensus from those interviewed for the review is summarised below and expanded upon in the following sections of this submission.

- **New Zealand's RSI system is not delivering on some national needs.**

  While the current RSI system is delivering some excellent research, more focus on applied environmental science is urgently needed to address many of the challenges we presently face as a nation. Of particular importance, science policy and the allocation of funding to environmental and natural hazards science areas is not consistent enough under the present RSI system to allow for the required robust and long-term science. As a case in point, New Zealand's state-of-the-environment monitoring datasets are a national taonga but are highly under-resourced at present (covered in more detail later).

- **Collaborations are sometimes impacted by unhelpful competition.**

  Despite existence of some successful collaborations, the lack of full funding for many institutions requires them to compete for a significant part of their total revenue. While competition does have some benefits, it has also led to unhelpful convergence of business models and overlap of operating areas for some of New Zealand's research institutions.

- **Complexity, constant change and insufficient resourcing impede RSI system engagement with Māori and some end-users**

  For such a small country, our RSI system includes a plethora of funding mechanisms that are introduced, altered or removed frequently. These include SSIF, NSCs, the Endeavour Fund and several smaller schemes such as the Vision Mātauranga Capability Fund (VMCF), as well as former mechanisms such as Outcome-Based Investments.

  Acknowledging that there are some good connections with end-users, the complexity and constant change of the RSI system are barriers for end-users of government-funded environmental and natural hazards research, such as regional authorities, to fully understand the system and to respond to signals and changes as quickly as needed.

  Resourcing for Māori to engage with and within the RSI system is particularly lacking. As highlighted in the Future Pathways Green Paper, and other documents, the inclusion of mātauranga Māori and Te Ao Māori is important and requires much greater emphasis and effort to embed across the whole RSI system.

CHANGES TO OUR RSI SYSTEM MUST BE ENACTED CAREFULLY

RSI system reform could be disruptive. Care needs to be taken to maintain a well-functioning RSI system that will continue to support New Zealand to respond to and recover from Covid-19, while

simultaneously dealing with a range of complex environmental challenges such as climate change and biodiversity loss. Thus, where appropriate, we recommend that any changes made to the RSI system should be synergistic with other relevant legislative or organisational reforms presently proposed or underway, such as the replacement of the Resource Management Act (RMA), the review into the future for Local Government, or improvements to New Zealand's Environmental Reporting System and the proposed NPS for Indigenous Biodiversity. Of key importance for Te Uru Kahika is that the RSI system must continue to produce rigorous science to support policy-making and environmental management.

OUR FEEDBACK ON THE FUTURE PATHWAYS GREEN PAPER

In the following sections we provide our feedback to the themes in the main sections of the Te Ara Paerangi Future Pathways Green Paper.

RESEARCH PRIORITIES

- **Te Uru Kahika is very supportive of proposals to develop a consistent set of national research priorities.**

  As mentioned above, there is some excellent environmental research being conducted in New Zealand but, in general, current RSI funding mechanisms do not provide sufficient clarity on national or regional priorities, nor sufficient incentive for researchers to focus on them. In the immediate term, identification of regional and national research needs could draw heavily on existing science strategies, such as those developed by the regional authorities[6], and the Department of Conservation and the Ministry for the Environment[7]. We emphasise that the provision of research through the national priorities must be coordinated and timed to line up with New Zealand's policy-making and planning needs.

- **Agreed principles must be jointly developed before national research priorities are set.**

  Principles for the development of national research priorities should include co-development with Māori to give effect to Te Tiriti, with processes in place to enable this. Central government, local government, scientists and other partners should also be involved in developing the set of principles and processes by which the priorities are to be determined. For example, the research priorities should reflect the strategic needs of New Zealand, both in the medium and longer-terms, and it is anticipated that these will change with time in response to both changing national and international pressures and opportunities – so how often the national priorities are to be updated, by who, and what support is given to scientists and institutes that may need to shift their areas of research, will all need to be worked though. Te Uru Kahika recognises that the Future Pathways

[6] https://www.envirolink.govt.nz/research-strategy/
[7] https://environment.govt.nz/facts-and-science/science-and-data/conservation-and-environment-science-roadmap/

consultation is just the start of such a process, and we look forward to further involvement.

- **Delivery on national research priorities will require well-coordinated effort from within and outside the RSI system.**

  The NSCs are New Zealand's most recent collection of mission-led programmes, but they were not sufficiently coordinated with the rest of the RSI system and as a result have struggled to engage with or influence the direction of aligned non-NSC research, such as that funded by SSIF or government departments or regional authorities. We note that delivery on national research priorities may also require contributions from outside the traditional RSI system, such as the health sector. Moreover, it is likely that there will be some interlinkages between the various national research priorities, so coordination will be required to avoid unhelpful siloism or duplication. The relative importance of the national research priorities may vary from place to place, so coordinating with mana whenua, communities, and regional/local organisations will be vital. These details all highlight the need for RSI settings that enable better system-wide coordination in the future.

TE TIRITI, MĀTAURANGA MĀORI, AND MĀORI ASPIRATIONS

- **Te Uru Kahika supports a shift to a Tiriti-based RSI system.**

  Regional authorities are already partnering with Māori to deliver better outcomes for Māori and all New Zealanders. We acknowledge the importance of tikanga and worldviews of Te Ao Māori. We recognise the distinctness and value of mātauranga as a knowledge system. We strongly support an enhanced RSI system that funds iwi/Māori priorities and builds capability and capacity among Māori researchers. We note that positive improvements in the RSI system are already being made in these regards.

- **A Tiriti-based RSI system may look very different to the present and take time to design and implement.**

  Giving meaningful effect to Te Tiriti o Waitangi may require markedly different governance arrangements, priority-setting approaches, investment mechanisms, reporting and evaluative frameworks, and/or intellectual property[8] considerations compared to today's RSI system. Te Uru Kahika would welcome the opportunity for input, and we encourage allowance of adequate time and resourcing for these and other RSI system design decisions to be appropriately worked through by Māori and the Crown.

[8] This includes sovereignty of mātauranga-a-iwi/hapū, Māori knowledge and data, which are issues of recognised importance presently being considered by a range of organisations and initiatives. For example, see the Mana Ōrite Work Programme developed between Statistics New Zealand and the Data Iwi Leaders Group of the National Iwi Chairs Forum.

- **We support nearer-term modifications to the RSI system to support increased engagement of Māori, providing such changes do not impede the overall shift to a fully Tiriti-enabled system.**

  We recommend increased funding for research that is Māori-led and/or that facilitates Māori connections with the RSI system. The VMCF has provided a good start, but its budget is relatively small and limited in scope for what can be funded. We suggest that a new fund for medium-sized projects and/or emerging Māori researchers could be established to support the on-going development of mātauranga and bridge the gap between VCMF projects and the significantly larger programmes funded by mechanisms such as Marsden or Endeavour.

  In principle we support the concept of regionally-based knowledge hubs as described in the Future Pathways Green Paper. Some such entities already exist and have established working relationships with regional authorities. Successful extension of this concept would depend on close involvement of Māori in their design and operation, which may require extensive consultation.

FUNDING

- **Increased long-term funding is needed for applied environmental research.**

  New Zealand is facing a range of increasingly urgent and complex environmental issues, including natural hazards and biodiversity protection. Finding appropriate responses to these issues requires long-term applied research, which in turn requires stable, long-term funding. But funding for such research has become much more difficult to secure[9] because MBIE's assessment of research proposals places emphasis on science novelty before impact benefits for New Zealand. We strongly recommend a rebalancing to provide more funding for applied environmental research, including long-term monitoring programmes, and assessing research proposals foremost on their potential to create outcome benefits for the nation.

- **Mechanisms for environmental and human health research should be better linked.**

  The Health Research Fund (HRF) is of substantial relevance to the regional sector because there are many aspects of human health research that are directly linked to the environment (e.g., drinking and recreational water quality, air quality, emerging contaminants of concern, etc.). To date the HRF has been difficult to access and largely isolated from mechanisms for environmental research such as SSIF and the Endeavour Fund. New Zealand science and society would benefit from improved linkages between these funding mechanisms. The regional sector has had some positive discussion with the Health Research Council about a potential research partnership and will continue these discussions in the near term.

[9] As just one example, the regional sector has struggled for more than a decade to secure funding to develop national microbiological water quality guidelines for coastal areas.

- **Funding is needed for knowledge transfer as well as knowledge creation.**

  As in other countries, New Zealand's RSI system incentivises the creation of *information*, which scientists disseminate through publications, reports, presentations, etc. We recognise the value of such outputs as adding to the global body of scientific knowledge. However, creating benefits from such scientific outputs requires *knowledge transfer*, whereby key components from the total pool of accumulated scientific knowledge are vetted, interpreted, combined, and packaged for facilitated uptake by end-users to address their own specific needs.

  We recommend increased emphasis, funding and accountability for knowledge transfer across New Zealand's RSI system. Envirolink has been a very useful mechanism for transferring environmental research knowledge to the regional sector. Until early 2018 it was also a useful mechanism to transfer natural hazards research knowledge, when MBIE had a change in policy (or interpretation of policy). Increasing the funding for Envirolink, and establishing new funds like it (e.g. HazardLink, IwiLink) would provide a straight-forward way to extract useful knowledge from across the RSI system and make it readily available to end-users. Increasing the funding to support science knowledge transfer to the public would also be helpful.

- **Funding will deliver greater value for the nation if the RSI system becomes more efficient, open and accountable, with better systems for performance evaluation.**

  As much as possible, we recommend that science funding should be spent on conducting science. But in the current RSI system, competitive bidding between CRIs and other organisations consumes a great deal of resources, and the time spent is often considered unproductive because there is a relatively low success rate for research proposals. Many parts of the RSI system are also highly bureaucratic and heavily governed (the NSCs are a case in point), creating further inefficiencies. In some cases, research outputs are not open access, whereas it is our view that publicly-funded science and research should be freely and publicly available.

  We also recommend that the RSI system should develop a more effective and efficient system for evaluating the benefits from its investments, not only as a means of demonstrating the value of science for the nation but also as a means of holding research institutions to account for the funding they receive. At present, writing annual reports to MBIE is a time-consuming activity for many organisations, but it is not clear that these reports provide useful information to evaluate the RSI system's performance. The regional sector is a key end-user of research and could provide useful feedback to government on the impact of funded research, and we would welcome an opportunity to develop this idea further.

- **The regional sector seeks greater influence on RSI funding decisions.**

  Funding mechanisms provide a key lever for adjusting incentives and improving performance of New Zealand's RSI system which, as recognised in the Te Pae Kahurangi report, "is fragmented and supports unproductive competition while struggling

to adapt to changing national needs". Critically, regional authorities are key users of environmental and natural hazards research and would like to have more influence on science funding and policy decisions, particularly in relation to the Endeavour Fund, SSIF and knowledge-management transfer schemes such as Envirolink.

INSTITUTIONS

- **Te Uru Kahika recognises the valuable contributions being made by New Zealand's research institutions.**

  We consider that many of New Zealand's research institutions are already performing well. Moving forward, we agree that New Zealand's research institutions must serve the current and future needs of the nation, and that organisational agility, resilience and efficiency are among the characteristics they require to do so.

  However, regional authorities find that it is difficult to influence and access the science from some institutions at some times. This situation typically arises when institutional incentives drive scientists to publish, but not necessarily to transfer their knowledge to the likes of regional authorities or other potential end-users.

- **Where there is a need to improve the performance of research institutes, we encourage consideration of a range of approaches.**

  Improvements to the performance of New Zealand's research institutions could be delivered through adoption of shared overhead functions, even if the institutions themselves are not physically merged. Examples include cost-shared laboratories, equipment, libraries, human resource systems, data/IT systems, governance entities and so forth. Co-location has been previously used with some success to drive greater collaboration among research institutions, e.g. the Lincoln Hub, but delivers best value if all other necessary RSI system settings facilitate cross-institutional collaboration.

  The provision of more stable, long-term funding would likely improve the performance of certain research institutes, even if no other changes are made to RSI system settings. This is because the provision of more stable, long-term funding would decrease the fraction of their operating costs that many of our research institutions need to obtain every year through contestable processes. In turn this would reduce the current level of competition and duplication of expertise between some of New Zealand's research institutions. As noted above, applied environmental science is an area that needs more funding for the benefit of NZ Inc. We stress that in whatever topic areas it is applied, clear performance expectations would need to be laid out for any long-term funding to ensure that it is focused on the right priorities and used efficiently. We also consider that there are benefits to retaining some level of competition within the RSI system, for example for ensuring that the best science is being funded.

  With respect to CRIs in particular, performance improvements could likely be achieved through some of the levers already at MBIE's disposal. For example, the respective areas of focus of the CRIs could be clarified and given greater separation by making

adjustments to their Statements of Core Purpose. Greater direction into their work plans could be achieved by more prescription in their annual Statements of Corporate Intent and the performance metrics defined therein. More control on their science focus and operations could be obtained by greater direction of their SSIF contracts. Performance monitoring systems could be improved to provide greater tracking of the metrics that matter, such as delivery of impact benefits for the nation. However, nudging any of these levers would be most effective if done in line with a national list of research priorities.

We caution that changing any single setting in the RSI system will not necessarily improve the performance of New Zealand's research institutions. This is because the performance of any research institute is affected by several interrelated factors, such as governance arrangements, management approaches, business context or organisational size, mandate, structure and operating model. A change in governance arrangements may not enhance performance if the research institute's operating model is poor; likewise, changing a research institute's operating model may not enhance performance if other system settings are not conducive. Therefore, before altering any RSI system settings, care must be taken to develop a full, evidence-based understanding of the relationships and feedbacks between the many factors that can influence the performance of research institutions.

RESEARCH WORKFORCE

- **There are crucial shortcomings in the science graduate cohorts that are coming through New Zealand's education system.**

  There is a critical lack of graduates with cultural competency and the ability to work across science and mātauranga as complementary knowledge systems.

  Within the science disciplines, New Zealand's tertiary education system isn't producing enough graduates in certain areas, such as hydrology, hydrogeology, soil science, biosecurity and geomorphology, to name a few.

  As often as not, the science graduates coming from New Zealand's tertiary education system don't have the full spectrum of practical skills needed in today's workplaces, such as experience in real-world work environments, understanding of legislation, policy-making and planning, the machinery of government, project budgeting and management, or stakeholder relationship management (see below for options to address this issue).

  These above-listed shortcomings are being felt acutely by the regional authorities, central government and industry, as well as by other parts of the RSI system such as CRIs.

- **There is also a critical lack of industry training and professional development opportunities for New Zealand's science workforce.**

  Increasingly, professional scientists need to be able to work across disciplines in order to address the environmental and social challenges facing New Zealand, yet there are few opportunities for professional development to broaden the relatively narrow expertise gained in a university degree.

Upskilling in Te Ao Māori is urgently needed, not just in terms of increasing the engagement of Māori with and within the RSI system as described above, but also to increase the cultural competency of scientists who do not presently have this background. We emphasise that any such Te Ao Māori professional development initiative would need to be effectively resourced, coordinated and delivered with culturally appropriate methodologies.

Science management, i.e. leadership of science teams and projects, is also a special skill for which there are few professional development opportunities for working scientists or others interested in becoming science managers.

These limitations in professional development mean that New Zealand's RSI system is not always getting the best benefit of its own human resources. This creates unnecessary challenges to recruit new scientists instead of simply upskilling the existing workforce.

- **We recommend that New Zealand's RSI system should expand its mechanisms and support for the training and professional development of scientists.**

  One approach for achieving this would be to establish a more structured, formalised system of cooperative education, whereby the traditional university experience is complemented by a number of paid work internships in science organisations[10]. The first cooperative education programmes commenced over 100 years ago and are now offered by many universities and colleges in North America, Europe and Australia, but no such programme presently exists in New Zealand (though some science internships are available[11]).

  Formalised and sufficiently resourced professional development mechanisms should also be introduced into New Zealand's RSI system. Secondments and staff exchanges of scientists between regional authorities, CRIs, government departments, universities, etc. provide an opportunity for mutual benefit and upskilling. A centrally funded scheme could facilitate such exchanges, for example by salary cover for backfilling staff who have temporarily left one organisation to work at another.

  Regional authorities are well placed to support initiatives such as those listed above, either as host organisations for professional secondees or cooperative education placements, or by providing science staff to participate in such schemes.

INFRASTRUCTURE

- **Investment in RSI infrastructure should be planned and sustainable, and access to it should be coordinated and collaborative.**

  We agree that researchers should be able to access the infrastructure they need. We support a principle of "appropriate" infrastructure and suggest that using the latest

[10] The Canadian Association for Co-operative Education describes operating principles for such programmes.
[11] For example: https://www.internnzoz.com/internships.html, https://niwa.co.nz/internships, https://careers.aucklandcouncil.govt.nz/go/Grads%2C-interns-and-cadets/2923901/

technology to operate at the "frontiers of research" as suggested in the Future Pathways Green Paper may not always be necessary, or could be served by accessing infrastructure through national and international collaborations.

- **State-of-the-environment monitoring and reporting are crucial activities that need to be better supported in the RSI system.**

  As highlighted in Environment Canterbury's submission, the RSI system has a crucial role in informing the framework for state-of-the-environment reporting. This framework is premised on human-environment interactions and provides clarity for central and local government as to the science and research needs (and data and evidenced-based information required) to report on and inform New Zealand's sustainable development, and to evaluate the effectiveness of our policies and plans to achieve this.

  Further work is needed to ensure that central government's state-of-the-environment reporting programme and framework connects to the RSI system. This issue cannot be fully addressed exclusively by the proposed reforms to the Environmental Reporting Act[12]. Improvements are also needed in the RSI system to give greater support to timely provision of methods and approaches for monitoring and reporting to ensure New Zealand has the tools to monitor and report on the environment across all domains – in an ecologically meaningful and standardised way, over time and differing spatial scales.

  A nationally coordinated environmental monitoring and reporting system, together with prioritising and adequately funding research to address data and process understanding gaps, is critical to detecting, attributing, projecting, and managing environmental change. We strongly suggest that any design of research priorities supports a comprehensive national environmental reporting system, with aligned funding to support the data requirements, standards, process understanding, and time scales associated with this reporting. The regional sector is a critical contributor to this development and delivery and needs to be front and centre of any such system.

  In addition, central coordination and funding of the substantive datasets that are currently held regionally (e.g., by regional authorities and research institutions) but have national significance would enhance their utility, both nationally and internationally, now and for future generations. Here we include examples such as national soil mapping (SMAP), the Land Cover Database (LCDB), national LiDAR and climate datasets, all of which should be fully funded and not have to compete in the Endeavour Fund for project funding. Ensuring discoverability, accessibility, and interoperability of data is critical to ensure that central and local government investment in research and monitoring delivers best value and evidence to inform decision-making.

This ends our submission.

[12] https://environment.govt.nz/publications/improving-aotearoa-new-zealands-environmental-reporting-system/