Appendix

Summary

We recommend the reformed RSI system should have the following features:

1. **Te Tiriti**

   We support the green paper's vision for co-development of the RSI system with Māori, as well as highlighting the importance of providing equality across science and mātauranga and incorporating te ao Māori across decision making processes and design of the system.

2. **National Research Priorities**

   Purpose / Structure - We recommend grouping National Research Priorities (NRPs) by function: *Core Platforms* (sector-specific NRPs such as Environment and Climate, Transport, Primary Industries, Natural Hazards, etc); *Enabling Platforms* (smaller, more focused NRPs that can support multiple Core Platforms eg, technology-focused areas such as genomics or data management, or opportunity-focused areas such as alternative proteins); and *Enduring Platforms* (platforms that need stable, secure long-term funding).

   Scope - We recommend that NRPs should be broad in scope. We favour a single environment and climate change NRP. A single NRP can best coordinate the overlapping and multidisciplinary research that is commonplace in the environment sector, and best provide transparency for the prioritisation and funding process.

   Governance - We agree with the PCE's recommendation that funding should be allocated by those with expertise in the respective subject areas. We strongly support government having a participatory role in the governance of the NRPs, including strategy-setting and funding allocation.

   We recommend that an Environmental Research Council (ERC) or similar advisory body should be considered for setting sub-platforms within a single environment and climate change NRP and coordinating research between them in a holistic and system-level manner. However, we would like to see this build off existing structures in place and would be keen to discuss these ideas further.

   Funding - Priorities and funding are intricately linked – they cannot be considered in isolation. This includes a need to re-balance focus and types of research, particularly toward applied and operational research.

   We favour including a space for competitive funding *within* NRPs that can be strategically directed toward prioritised outcomes. The focus and quantity of this funding would vary between NRPs (or sub-platforms) and be set by the governance group of the NRP.

3. **Institutions**

Core functions - We recommend that environmental monitoring should be included as a core function (an enduring platform in our proposed design). Long-term measurement is the building block that supports a large proportion of environmental research and is an enabler for innovative and transformative research.

Focus - We recommend establishing clear purposes for the different parts of the RSI system and re-focusing the CRIs on production of, and access to public good data and knowledge, and a greater focus on applied and impactful research.

Capability - We recommend the future system enables better connections between research providers and capability building for young researchers to ensure succession and skills.

Infrastructure - We support the vision for infrastructure decisions that are more centralised, and for more co-located infrastructure to increase efficiencies and build capability. We recommend that an ERC or similar body would be best placed to use a holistic view for assessing and guiding research infrastructure needs for the environment and climate sector.

Commercialisation - Setting a focus for the RSI system on public good research would likely create issues with IP and commercialisation. We recommend clearer delineation of research aimed at commercialisable outcomes where appropriate, and possibly splitting off these activities.

Designing the RSI system

1. Te Tiriti

Te Tiriti should be reflected in all aspects of the RSI system

The Ministry supports the green paper's objectives to design an RSI system that is Te Tiriti-led and supports Māori research aspirations and mātauranga. Co-development and co-design of the RSI system "with Te Tiriti and Tiriti partnerships as a foundation" as the green paper envisions will be key, and we expect this will be an overarching principle that is present in all aspects of the RSI system, including those discussed below. It should also focus on providing equality across science and mātauranga and incorporating te ao Māori across decision making process and design of the system.

2. National Research Priorities

One of the central design features of the RSI system proposed in the green paper is the creation of NRPs. These would be "clearly expressed, whole-of-system" research platforms that would "focus activities of the research system and concentrate resources meaningfully towards national challenges and opportunities".

We support the use of NRPs, but careful design and governance structures will be needed to avoid re-establishing many of the same pitfalls such as lack of connection and opacity that affect the current system (more on this below).

Clarity of purpose for NRPs

In the environmental space, we expect the focus of the NRPs will generally be outcomes-based and mission-driven or problem-focused. Generally, we do not see any reason to prefer one focus over another when looking at the suite of NRPs as a whole. As laid out in the green paper, we can also envision a mix of types of NRPs functioning effectively.

Rather than concentrating on the focus of the NRPs, we recommend grouping NRPs by function:

- *Core Platforms* (sector-specific NRPs such as Environment and Climate, Transport, Primary Industries, etc)
- *Enabling Platforms* (NRPs that can support multiple Core Platforms eg, technology-focused areas such as genomics or data management, or opportunity-focused areas such as alternative proteins)
- *Enduring Platforms* (platforms that require stable and secure long-term funding. These would support core functions that require funding in perpetuity such as collections and databases, the National Standards Laboratory, or environmental monitoring).

This structure would provide clarity of purpose for the various NRPs in the RSI system and make it easier to evaluate NRPs against one another.

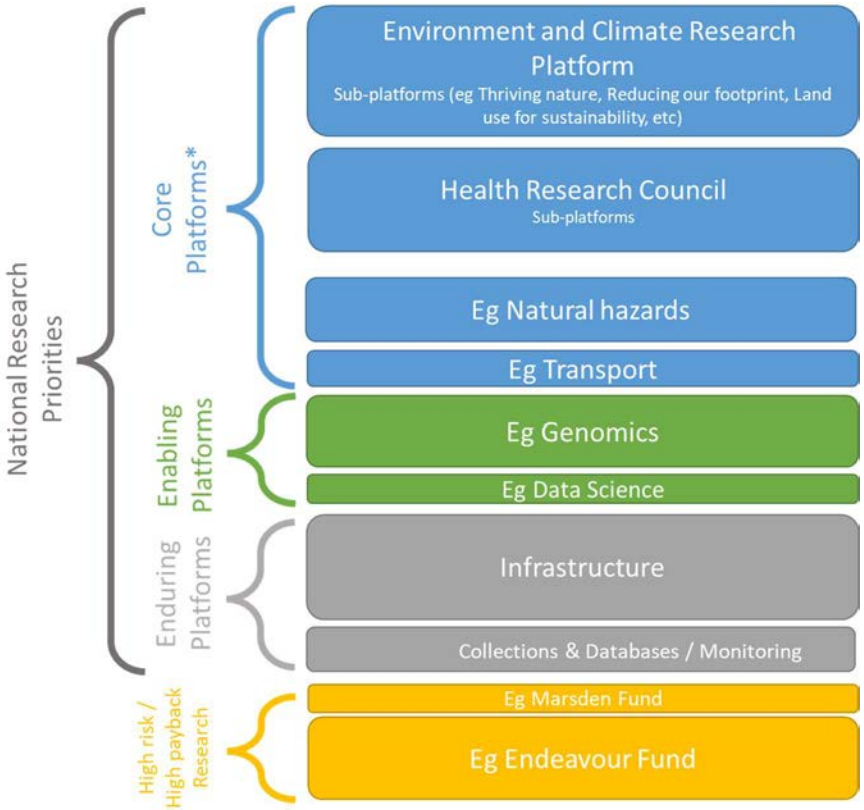

Figure 1. Proposed structure for National Research Priorities to improve clarity of purpose. *Note that Core Platforms may include a proportion of competitive funding (quantity and focus to be set by NRP governance).

A robust, independent NRP setting processes

We agree with the principles in the green paper on the process for determining NRPs: wide consultation, co-development with Māori, alignment with government research priorities, and independent expert decision-making. Of key importance is transparency of decision-making so that everyone understands the process behind the decisions taken.

Setting NRPs should be a robust, principles-based process undertaken by a group of independent experts. The group should consist of experts from all the relevant Core Platforms being evaluated and should transparently convey their decision-making process and rationale.

Because of the complex nature of environmental and climate research, we recommend a key principle should be that Core Platform NRPs should be broadly scoped (at the sector-level), made up of clear and tangible outcomes by which to evaluate the success of the platform's investment. This would provide the best research outcomes and transparency in funding allocation decisions. This would also allow sensible like-to-like comparisons and trade-offs between NRPs to be evaluated.

We also support broad, sector-level NRPs because it is unlikely for a single group overseeing all NRPs to have the expertise necessary to evaluate and determine scopes and boundaries for multiple environment and climate related NRPs.

Once NRPs are determined, this independent group of experts should then set funding levels (within the approved RSI budget) across these sets of platforms.

We stress that stability is key in research, so the system needs some degree of long-term certainty, and it is not desirable for priorities to constantly shift or realign. We suggest a priority setting process every 5-10 years would be appropriate, but with a mid-term evaluation of performance to ensure the investment is on track for delivering expected outcomes.

A single environment and climate focussed NRP

The scope of NRPs will be of critical importance to the success of the reformed RSI system. The Ministry strongly supports broadly scoped NRPs and prefers a model with a single NRP for environment and climate-related research, and would look forward to discussing this design option with you. Due to the interconnectedness of environmental systems, we strongly support including climate change research in this structure rather than having it as a separate NRP but recognise it may need a separate funding mechanism.

A single NRP can take a holistic view of natural resource sector research and coordinate it accordingly. Consolidating environment and climate research into a single NRP builds on the complementarities of infrastructure, skills, data and workforce, and the need for coordinated leadership that would be difficult to achieve if research is spread across multiple NRPs. It would ensure that cross-boundary issues are considered, and that the strategic outcomes determined by the sector are best given effect.

It would also increase transparency in funding decisions and how different priorities are traded off within an envelope of limited resources. A larger scope (with good governance) forces you to lay out the case for why you are allocating the funding within the scope in the way you are. This transparency is much more difficult in a system where multiple unrelated NRPs must be set and evaluated against each other by a group that cannot possibly be an expert in every possible NRP.

Our experience is that it requires extensive subject matter expertise to scope platforms or sub-platforms. There is no “right” way: no matter how they are scoped (eg, by theme, domain, function), boundary issues will inevitably arise, and there will always be worthwhile and relevant research that falls on the boundary, raising questions about the best “home” for it. This is especially pertinent for environmental research, which is rarely confined to one domain, and complex and interdisciplinary research is often the default. This will make a system with multiple environment and climate Core Platform NRPs more difficult to develop and coordinate, and risks creating silos and research gaps.

An example of this is research on climate change effects on biodiversity. The Biological Heritage NSC thought this was tackled by the Deep South NSC, while the Deep South NSC thought it should be covered by the Biological Heritage NSC, with the result that no one took ownership of this critical research. These intersecting areas of research are commonplace in the environment, so a crucial design feature will be to enable the system to facilitate research that crosses boundaries.

If the mission of an NRP is too narrowly defined there is also a risk is that it will get stuck in one direction of thought. A narrow scope will also reduce the ability of the NRPs to adapt to changing research needs and increases the risk of capture by a single research provider, where the provision of research and capabilities become monopolistic.

Table 1. Governance structure pros and cons

	Single environment and climate NRP governed by ERC or similar body	Multiple environment and climate NRPs governed by ERC or similar body	Multiple environment and climate NRPs with no coordinated governance
Pros	• Single NRP can be easily evaluated against other NRPs • Governance has environmental expertise and can take a holistic view of research and funding needs for the sector, can determine sub-priorities and coordinate research and research foundations across them • complementarities of infrastructure, skills, data and workforce, and the need for coordinated leadership are easier to achieve • Reduced need for environment and climate research expertise at the NRP-setting level • Increased transparency of funding decisions	• Governance has holistic view of research and funding needs for the sector, can coordinate research and research foundations across NRPs	• Reduced amount of governance may increase decision-making efficiency
Cons	• Requires additional level of funding allocation (between sub-platforms within the NRP)	• Significant environment and climate expertise and involvement with relevant stakeholders would be needed to determine the environment and climate NRPs before they could be evaluated against other NRPs • May be more difficult to evaluate multiple environment and climate related NRPs against other NRPs • Boundaries between NRPs may be more difficult to navigate across the sub-platform boundaries within a single NRP	• Increased likelihood of siloed or duplicated research, or research falling through gaps between the NRPs • Significant environment and climate expertise and involvement with relevant stakeholders would be needed to determine the environment and climate NRPs before they could be evaluated against other NRPs • May be more difficult to evaluate multiple environment and climate related NRPs against other NRPs • Boundaries between NRPs may be more difficult to navigate across that sub-platform boundaries within a single NRP

If a single NRP structure is not adopted, we still support a system of fewer NRPs with broad scopes, as this would best position the RSI system to provide the research and data needed for environmental

stewardship. However, it would require an additional level of governance to manage the overlaps and coordinate the various strategies.

Governance of an environment and climate change NRP

The key function for NRP governance is to provide expert advice on setting strategic sub-priorities and allocation of funding. We support the green paper's recommendation to shift to a structure where the NRPs themselves are strategy-led.

We think a range of options should be considered so that investment decisions more clearly connect to the needs of the sector. This includes an Environmental Research Council (ERC) as proposed by the Parliamentary Commissioner for the Environment, but could include other governance structures such as a body similar the Climate Change Commission that would not make the final decisions, but would provide analysis and advice that must be transparently responded to. MBIE, as the agency with responsibility for the RSI system, could retain responsibility for allocating the actual funding, as we prefer a structure that takes advantage of MBIE's expertise in this area. However, we think these options should also consider how we can build off existing structures in place, and would value the opportunity to work through the various possibilities with you.

The governance structure should include subject matter experts from within government agencies and national and international research organisations. This group would identify sub-priorities within the Environment and Climate NRP which could be outcomes-focused (eg, thriving nature, reducing our footprint, sustainable land use, climate adaptation), or focused on a specific time-bound mission (eg, Kauri dieback). An example for how this could work is the Environment and Climate Research Strategy (ECR Strategy) which is currently being developed to test how sector strategies can guide strategy in the RSI system. We note the trend in the environmental science community towards minimising groupings based on biophysical characteristics or discipline, in favour of interdisciplinary and outcomes-focussed research. Because of this, integration and co-operation should be a key goal.

An overarching governance structure would take a holistic view of the research needed to achieve strategic outcomes, coordinate cross-cutting and multi-disciplinary issues, and ensure the research portfolio is designed as a cohesive whole.

The current system has not focussed on the applied and operational research urgently needed by the environment and climate sector. Any governance structure must have the expertise to properly balance the need for foundational, long-term, and applied research with innovative or transformative research. A broad structure featuring environmental subject matter expertise would also be best positioned to provide transparency with regard to delivery against strategic objectives and effectiveness of funding choices or monitoring of research provider performance.

Funding

Competitive funding within NRPs

We support retaining investigator-led research that is not tied directly to strategy, such as through the Endeavour and Marsden Funds (with some adjustments to the current system) but recognise that there

is also a need to direct competitive funding toward innovation that is strategically directed to deliver on research and mission priorities (alongside the fundamental, long-term research that is also a priority).

In the current system almost all relevant funding goes to the CRIs through mechanisms that are not open to competition (ie SSIF). This can result in a system that struggles to enable targeted innovation and can easily be dominated by a small club of providers – if you're not part of that club you can't get a foot in the door.

There is currently no mechanism envisioned for competitive funding that is directly tied to strategic needs or outcomes-focused research. Allocating a proportion of funding within the NRPs to competitive funding (while minimising transaction costs) would be an effective mechanism for directing innovation toward priorities identified in the NRP strategies, while retaining untargeted competitive funding in the Marsden and Endeavour Funds.

Funding governance within NRPs

Funding governance and allocation is intricately linked to the design of research priorities and strategies, and what will be effective depends on the interplay between those. The green paper is largely silent on the role and purpose of different types of funding; however, consideration of the mechanisms for funding research and links to prioritisation are crucial to the success of the RSI system.

We strongly agree with the PCE's recommendation that funding should be allocated by those with expertise in the respective subject areas[1]. The Ministry and other relevant government agencies must be part of the governance structure that oversees both the structure and allocation of funding, and we would not support a system where this is not the case.

As with prioritisation, this governance would be best achieved through an over-arching governance structure. We believe this will be the most effective mechanism for creating the direct link between strategy and funding that is largely absent in the current system.

As discussed above, in addition to prioritisation, this governance group would also provide advice on appropriate funding allocation amounts and types *within* an environment and climate NRP. This would allow subject matter experts to recommend not only the quantities of investment for each sub-priority within the NRP, but also the proper mix of funding types. Some sub-priorities may require innovative solutions, in which case a higher proportion of competitive funding may be recommended. Alternatively, other sub-priorities may need sustained, targeted funding to study fundamental environmental questions, thereby requiring a larger proportion of negotiated funding to be allocated. This flexibility, and recognition that different priorities have different funding needs, will enhance the ability of the system to deliver the science and evidence needed.

Having a single environment and climate NRP will also simplify funding negotiations with CRIs and other research providers. Instead of having to consult and settle funding arrangements with several different NRPs, CRIs would have a single point of contact that has a complete view of all the research that will be required when discussing the stable, negotiated, portion of funding.

[1] https://www.pce.parliament.nz/publications/environmental-research-funding-review

Retain Investigator-led funding

We recommend the future RSI system should enable two types of competitively funded, investigator-led research: 1) research that is strategically focused and would be based within NRPs (as noted above), and 2) research that is not directly tied to strategy or priorities.

We support the retention of Endeavour and Marsden Funds as places for competitively funded, investigator-led research that is not directly tied to strategy or priorities. However, a larger proportion should be allocated to research on environmental impact. The current evaluation criteria places too much emphasis on requirements for transformative or cutting-edge research, often to the detriment of research focused on the environment or Māori. We recommend a re-setting of the evaluation criteria for these funds so that it has a stronger link to the public good, and outcomes identified by Māori and government, and is more amendable to utilising different knowledge systems, while still retaining freedom to explore new and novel ideas and topics.

Monitoring should be a core function

The green paper seeks input on core functions, including how to identify and fund them. We do not have a detailed position on identifying core functions, other than to note that things that we generally consider core functions often have three key qualities: 1) they require funding in perpetuity (and in New Zealand, are often at risk of funding loss because they are funded through competitive processes eg, some collections and databases); 2) they are used widely and support a diversity of users and industries; and 3) they are not viable for the private sector to provide, or if done by the private sector, access to, and impact from the research or capability would be greatly limited.

We recommend that environmental monitoring should be included as a core function (enduring platform in our proposed structure), as it fits the general definition. Long-term measurement is the foundation upon which a large proportion of environmental research is built. Without the data collected by these monitoring systems it would be impossible to test hypotheses and to determine progress towards improving outcomes for the environment. It is an enabler for innovative and transformative research as well. The environment is changing on multiple temporal scales, with cumulative effects, so we need to avoid *ad-hoc* funding for monitoring sites (eg, river sites, soil quality sites, air quality monitoring). Long-term stable funding for monitoring also gives researchers certainty to begin long-term research projects and ensures that the data record is available when new or novel issues arise.

Base grant considerations

The Ministry's current relationship with CRIs and other RSI providers is often as a customer. Because the current system struggles to respond to the priorities of the environmental sector, the Ministry procures much of the science and data needed for our policy development and reporting responsibilities. We do not have a position on the use of base grants, but note some points based on our experience for your consideration.

One consideration is that base grants will change the relative cost of services by non-base grant institutions. This could have the effect of limiting the ability of small research providers to provide competitive services to government, even though they may be more resource efficient in terms of overheads and may also provide more innovative ideas.

We note that it could be difficult for base grant holders to demonstrate that they are using the grant efficiently. Base grants mainly make sense when there is one provider for a specific on-going service (such as core functions). Providing base grants would also reduce the amount of funding available for research.

Institutions

Institutional models

We do not have a preference for reorganising the CRIs into a single organisation, fewer and larger organisations, or retaining the status quo. However, we note that although consolidation would be an effective mechanism for reducing competition and duplication between research providers, increasing the size of organisations inevitably creates inertia and creates monopolies that can crowd out smaller think tanks, university researchers, etc. It can also reduce agility and create additional bureaucracy that internal workers then need to navigate.

The Ministry agrees with the issues with the CRI model noted in the green paper and supports removing them from the company model of operation, particularly to address issues around capability retention. Removing CRIs from the requirement to make a profit would help them to be more resilient in years of poor funding outcomes, enabling retention of research capability and capacity. For example, cuts to soil science funding in 2003 resulted in many scientists losing their jobs or moving on, resulting in significant impacts to this field of research that took a long time to re-establish. It will also address the issue where CRIs are forced to follow funding, which can also impact capability to address research topics.

Institutional focus should be on public good research

The current system suffers not only from duplication of capability, but also duplication of role. There should be a clear articulation of identities that CRIs/NRPs, universities and consulting companies will hold in the future system. In addition to duplication, the current lack of defined roles also results in gaps. For example, New Zealand currently lacks a locus for ‘deep and narrow’ systematic research (which in other countries is often conducted at academic research institutes).

An important shift that this reform should enable is a shifting of the public research sector to have a stronger focus on public good research delivery, with a stronger emphasis on applied and impactful research (and the foundational knowledge specifically needed to support this). This shift in focus should be an important feature of any realignment of RSI institutions.

Increased connections to build capability

Whether the future system shifts to one large research organisation or many smaller ones, the future system needs to foster a mosaic of innovative research teams that are connected domestically, but also internationally. These teams should also connect to support training and capability building for young researchers, ensuring succession.

Our experience is that there is very little knowledge transfer between university students and research providers. There is no or little partnership between universities and CRIs to fund PhD or postdocs, apart from some initiatives from Lincoln University, and the University of Auckland (Joint Graduate School in Biodiversity and Biosecurity and Te Puna Matatini). In France, for example, public research centres such

as CNRS or INRAE are part of research laboratories, where students are taught by researchers, and could continue in research if they wish to through "research units", with shared working space between university staff, researchers, and teachers. Stronger connections between the RSI system and universities could build a capability pipeline.

Centrally planned infrastructure

We support the vision for infrastructure planning and use that is more centralised, and for more co-located infrastructure to increase efficiencies and build capability. Identification of key infrastructure needs should flow out of the NRP strategies so that infrastructure investment aligns with and supports priority research issues and outcomes.

Commercialisation and IP may be separated

Shifting to a system where the different research organisations have different roles raises the issue of how to handle Intellectual Property (IP) and commercialisation. In the current system, organisations are incentivised to retain IP ownership to derive revenue from commercialisation. However, only a small percentage of research is commercialised, and much research and data ends up owned by CRIs or private companies where it can be difficult to access. The need for commercialisation also results in data and research that would have broad application, a broad user base, and clear public good utility (eg, climate change projections) being effectively put behind pay walls. Licensing research and data that is funded by the RSI system under creative commons (unless there are good, transparent arguments not to eg, technology development requiring a commercial pathway), would enable the open sharing of research results by research organisations, strengthen the shift to a public good focus, and increase the impact of the research.

This highlights a hole in the current system for commercialisation. If the role of the future CRI(s) is to focus on public good research, it would necessitate moving commercialisation activities out of the research organisations themselves. We note this is already occurring at some universities such as with Auckland UniServices.