Cawthron Institute Early Career Researcher Group Response

Cawthron Institute is New Zealand's largest independent science organisation. We deliver world-class science that helps to protect the environment and support the sustainable development of primary industries in New Zealand and worldwide.

This response was prepared to share Cawthron Early Career Researcher (ECR) perspectives on the Te Ara Paerangi Future Pathways Green Paper. Cawthron's ECR Group represents over fifty researchers and technicians who are currently completing or have completed their postgraduate qualifications in the last 10 years. As ECRs within a large independent science organisation, we believe that we have a unique perspective on how changes to research funding, institutions and priorities could affect the wider science system (beyond just universities and CRIs). Other groups within the Cawthron Institute have also prepared responses, including our science strategy leaders and Te Kahui Āio.

Over the last three months we held two workshops open to all Cawthron ECRs to discuss the green paper and formulate a collective high-level response to its questions. Volunteers from our group then led the development of responses to questions we identified as particularly relevant to ECRs. These collated responses were reviewed and approved by a meeting of the ECR Group in early March. The views expressed here are those of the ECR Group; they do not necessarily represent the views of the Cawthron Institute.

In general, Cawthron's ECR Group is supportive of many of the suggestions laid out in the Te Ara Paerangi Future Pathways Green Paper. Our key recommendations, summarised here, are further elaborated in the sections below:

1. Design research priorities to include a spectrum of applied and fundamental research
2. Directly engage ECRs in the design of research priorities
3. Engage Māori on equal meeting grounds and with appropriate partners
4. Review the Vision Mātauranga policy
5. Invest in iwi/hapū to enable their engagement in research projects and proposals
6. Designation of core functions should be de-coupled from government priorities and informed by consultation with major research providers, among others
7. Analyse how base grants will affect different types of organisations
8. Convene a group of research sector representatives (including ECRs) to comment on more detailed system funding proposals as they are developed
9. Critically evaluate the outcomes of base grants to promote public accountability
10. Include the development of systems to support collaboration in institutional reforms
11. Retain and create regional research institutions and/or offices
12. Improve ECR job security and career pathways across CRIs and academia
13. Prepare students for careers beyond the academy
14. Provide robust training across the RSI workforce on how to be tangata Tiriti
15. Use base grants to create permanent ECR positions and support career progression
16. Evaluate institutions receiving public funding according to workforce outcomes
17. Revise performance evaluation to include more holistic measures of research impact
18. Improve support for co-supervision of students by universities and CRIs/IROs
19. Create umbrella organisations to manage nationally-important research infrastructure

NGĀ WHAKAAROTAU RANGAHAU | RESEARCH PRIORITIES

1. What principles could be used to determine the scope and focus of research priorities?

We support the identification of research priorities to guide New Zealand's RSI investment across the system. Research priorities should address current problems and opportunities, and longer-term changes of significance to New Zealand's communities and environment.

However, we are also concerned that research priorities could become conflated with short-term political or societal priorities, leading to an overemphasis on reactive and applied research at the expense of longer-term 'fundamental' research. Fundamental research requires time to study the underlying structures and processes that drive changes in social-ecological systems. This knowledge is critical to understanding the drivers and outcomes of current issues, to better support their prevention and management. The findings of fundamental research will in turn inform research on short term priorities.

We therefore recommend that research priorities are designed to include a spectrum of applied and fundamental research. Each research priority would be pursued through a combination of short-term projects that respond to emerging issues or opportunities (e.g. Covid-19), medium-long term projects that build understanding of the system within which issues and opportunities arise (e.g. socio-economic determinants of disease), and experimental or blue-skies projects that develop novel approaches to priority areas (e.g. therapeutics development). This approach to priorities would allow for a sustainable circle where New Zealand's immediate priorities provide direction for our fundamental research, which would in turn inform the identification of new research priorities.

We also recommend the direct involvement of ECRs in the design of research priorities. Without such representation, the selection of priorities will likely reflect the interests of established researchers, yet these priorities will have the greatest impact on the research and career development opportunities of ECRs.

2. What principles should guide a national research priority-setting process? How can this process best give effect to Te Tiriti?

3. How should the strategy for each research priority be set and how do we operationalise them?

We recommend that the strategy for each research priority should incorporate a spectrum of applied and fundamental research. **Each priority could be organised into short-, medium- and long-term workstreams** that collectively build our understanding of the priority area.

Funding for short-term projects would be allocated on an iterative basis, enabling the RSI sector to be responsive to immediate issues and emerging problems or opportunities. For example, this could include the development of methods, tools or techniques to address current issues. It could also include research on local or regional priorities that often are neglected within national priority-driven systems. Most of this research would be of an

applied nature, focusing on the generation of insights, ideas, and methods that could be implemented within 1-2 years of the conclusion of the research.

Medium-term research on priorities should be more proactive, focused on producing novel insights into key components of the priority area, and the development of responses to key issues or opportunities. This research should respond to medium-longer term trends in social and environmental conditions, while building our understanding of the priority area. For example, three yearly State of the Environment reporting could help to inform the identification of key issues and needs for biodiversity or freshwater research priorities. The results of this research would include a mixture of applied insights that could be implemented within 2-4 years of the conclusion of the research, and more fundamental insights that would identify further research needs and opportunities.

Long-term workstreams should be even more proactive, focusing on fundamental and 'blue skies' research that will significantly advance our understanding of the priority area. This research could involve the collection of national-scale or long-term studies, development and testing of solutions, and exploration of novel ideas. This research would set up the next round of research priorities in the field.

TE TIRITI, MĀTAURANGA MĀORI ME NGĀ WAWATA O TE MĀORI | TE TIRITI, MĀTAURANGA MĀORI, AND SUPPORTING MĀORI ASPIRATIONS

4. How would you like to be engaged?

For engagement in Te Ara Paerangi, and for all further engagement regarding science in Aotearoa, it is important to consider the space where the interaction will occur, the time, and what layer (iwi/hapū/whānau/other) is being engaged with (and whether this is appropriate). For this green paper, and for further engagement regarding science in Aotearoa, **engagement should be on equal meeting grounds and between appropriate partners.**

Clarification is needed around who is expected to undertake engagement. Currently, institutions displace responsibilities for engaging with Māori communities to researchers, causing ECRs to navigate these relationships without appropriate training or support. This puts ECRs at risk of permanently damaging relationships with Māori and contributes to negative experiences for Māori in research. Across research engagements as a whole, no ECR should be responsible for leading the development of relationships. Rather, institutions must take responsibility for relationship development and engagement so that it is Rangatira ki te Rangatira.

5. What are your thoughts on how to enable and protect mātauranga Māori in the research system?

Vision Mātauranga is no longer fit for purpose and needs reviewing. Some of the key things that we believe need to be included or updated within the VM framework:

- A directive to respect the expertise of Māori scientists by including them in funding bids as subject matter experts, not engagement facilitators.

- Capability development for researchers/ECRs to learn how to effectively engage with Māori to meet their obligations under the treaty.
- Direct funding to Māori communities for research-related resource and capability development, independent of third-party bids.
- Policies for the protection of IP, taonga and neutral partnerships.
- A clear understanding of how any benefits flowing from research will be realised and by whom.

6. What are your thoughts on regionally based Māori knowledge hubs?

We support the idea of regionally-based Māori knowledge hubs, but note that their success will depend on how they are governed. It is important that Māori knowledge hubs are Māori-led and governed by tangata whenua, so that they do not become another vehicle of colonisation. We acknowledge that **there needs to be significant investment in iwi/hapū to enable their engagement in both research projects and proposals**, and that regional hubs provide a pathway for such investment. Such investment would enable iwi/hapu to develop and promote their areas of interest that scientists can then offer to work collaboratively on. Moreover, the government should fund local iwi/hapū science officers, who would act as a direct contact for all local research institutes, enabling the true co-development of all new research projects. A benefit of this role would be ensuring the right iwi are partnered with projects which they believe in, stimulating the development of meaningful and long-term relationships.

TE TUKU PŪTEA | FUNDING

7. How should we decide what constitutes a core function and how do we fund them?

We think that the **designation of core functions should be 1) de-coupled from government priorities** and **2) informed by – but not limited to – consultation with major research providers.**

First, core functions should be de-coupled from the priorities of the ‘government of the day’, with long-term funding horizons to allow for certainty in method development, infrastructure and personnel investment. It is currently unclear how the core functions proposed in the Green Paper differ from the concept of government-directed ‘priorities’. It seems that core functions act as long-term government/societal priorities, albeit ones that can have short term spikes in funding (e.g. during a pandemic, or natural disaster). To prevent whiplash between successive governments, core functions could be decided in consultation with the research sector and multiple political parties.

Second, designation of core functions needs to be informed by CRIs and major research providers, but alternate and marginal views should be explicitly sought so that adverse effects of strategic behaviour can be identified and minimised. We are concerned that the designation of ‘core’ functions will be surrounded by jockeying among organisations to have their most strategically favourable function listed as ‘core’. At worst, the scramble to define ‘core’ functions could be used to provide certainty for a few, presently powerful organisations at the cost of promoting a collaborative/cohesive research sector. We recommend MBIE investigate how funding mechanisms comparable to base grants have played out in the past

and what strategic behaviour has arisen, and how this can be managed – for example, SfTI https://www.sftichallenge.govt.nz/.

8. Do you think a base grant funding model will improve stability and resilience for research organisations? How should we go about designing and implementing such a funding model?

We agree that a base grant model would improve stability and resilience for some larger organisations, but we are sceptical about whether it would level the playing field of research overall.

We agree that the existing 'overheads' funding model is resulting in perverse outcomes and that a base-funding model might address some of these issues. We see opportunity for base-funding to 'smooth' the peaks and troughs within the RSI system, providing potentially more secure employment and clearer signals for infrastructure providers. However, **we also see major potential for perverse outcomes from base funding**, as organisations will spend time and energy lobbying for base grant funding, and once this arrangement is established, it will likely lead to inefficiencies, monopolistic behaviour, and gatekeeping.

Evaluating outcomes from base grants is crucial to keeping the system accountable to the NZ public. This can include science outcomes but also should include indicators of valued outcomes like collaboration across the research sector (or at least, no evidence of monopolistic gatekeeping). Furthermore, base-funding obligations should include key performance indicators around the retention, development and opportunities for ECRs. This could help rebalance the science sector incentives toward hiring permanent full-time ECRs as opposed to limiting ECR roles to PhD's or fixed-term post-docs who attract lower overheads.

We also think that base grants could help support Māori engagement with the RSI system. Currently funding for Māori partner involvement is only obtained once a project/proposal is granted. Base funding for Māori entities could allow for Māori to engage more proactively in relationship building and co-development of proposals.

The transaction cost of administering base grant funding to smaller organisations will prove crucial for determining the scheme's overall effectiveness in providing a level playing field. We are concerned that the transaction cost for administering small base grants to small organisations will be high, and consequently that base grants will tend to be issued to larger organisations as a priority.

In addition to this consultation process, **we think robust analysis is needed of how the base grant approach can be expected to affect different types of organisations.** Consideration needs to be given to what the impacts of inclusion (or exclusion) in base-grant eligibility will have for researchers in sectors such as university/academia, government departments, crown research institutes, independent research institutes, consultancies, Māori entities, and regional councils to ensure the outcomes do not have significant, negative unintended consequences. For example, if the transaction costs of adding small entities to base grant eligibility is high, then these entries may self-select out of the research system, which may create inefficient outcomes for society as only the larger organisations

can afford to lobby/apply for base grant funding. For all of the flaws of our current 'overheads' model, it is something that can be applied for even by small providers based on the merit of the ideas proposed.

Since it is difficult to comment in the absence of a detailed structure/proposal for base grants, **we recommend that MBIE convene a group of research sector representatives from a range of career stages (including ECRs) to comment on proposals as they are developed.**

NGĀ HINONGA | INSTITUTIONS

9. How do we design collaborative, adaptive and agile research institutions that will serve our current and future needs?

We support institutional reform to reduce duplication of functions and gatekeeping behaviours, and to promote collaboration between institutions. However, we caution against simply merging existing institutions. In our experience of Cawthron, a moderate size (~300 staff) enables good knowledge of people and groups across the organisation, facilitating strong science collaboration. **We urge that any reforms encompass not only on the design of institutions, but also the development of systems to support improved collaboration across the RSI sector** (e.g. systems that promote access to research infrastructure).

Currently, collaboration between institutes is not encouraged due to the overly competitive funding landscape; we believe that evidence of collaboration needs more weight in funding proposals. Evaluation should also recognise that collaborative research occurs outside of large research projects. ECRs at Cawthron are often involved in consultancy work, which is an incredible capability development exercise in delivering impactful research. Such consultancy work often leads to important research insights that are directly applicable to primary industries and communities. **We believe that key performance indicators for funding proposals should include collaborative research, relationship building and consultancy outcomes**.

Further, **we advocate for the retention and creation of regional research institutions and/or offices.** In some cases, it may be possible to co-locate research institutions or offices near key users or partners in the institution's primary research (e.g. iwi entities, regional councils). The lack of regionally-based institutions impacts communities and iwi outside of NZ's three main cities. While it would be unsustainable to have research institutions in some of these regions, investment should be made to facilitate relationship building between institutions and communities further afar. Again, there needs to be acknowledgement of the time put into this sort of relationship development when it comes to funding applications.

10. How can institutions be designed to better support capability, skills and workforce development?

We believe that CRIs and academic institutes would greatly benefit from providing more job security for ECRs. The Cawthron Institute provides ECRs with job security –

there are very few short-term contracts, and short-term contracts are commonly a steppingstone to permanent employment. This, combined with the leadership and project management opportunities offered, results in ECRs who feel heard, valued and willing to participate in activities that do not derive them any direct benefit. Job security for ECRs therefore benefits research institutions and the RSI sector as a whole.

11. How should we make decisions on large property and capital investments under a more coordinated approach?

12. How do we design Te Tiriti enabled institutions?

13. How do we better support knowledge exchange and impact generation? What should be the role of research institutions in transferring knowledge into operational environments and technologies?

TE HUNGA MAHI RANGAHAU | WORKFORCE

We endorse the Ministry's diagnosis of key issues for the RSI workforce, namely: equity diversity and inclusion; ECR career precarity; the education pipeline; movement within the research system; and international connections. If the Ministry is to address these issues, we believe the RSI sector reform will need to deliver the following workforce outcomes:

- Increase the number and range of ECR positions across the RSI sector (including positions for ECRs with Masters, PhD, and undergraduate or technical training)
- Improve job security for early and mid-career scientists by creating clear career progression pathways and reducing use of repeat fixed-term contracts
- A clearer pathway for international PhD students and postdoctoral researchers to build their careers in Aotearoa
- Increase mobility within and beyond the RSI sector by reducing barriers to movement between academic and non-academic positions
- Postgraduate training that prepares students for careers beyond the academy, and provides them with knowledge and skills to work on diverse, interdisciplinary projects
- Career progression that values non-academic research contributions (e.g. community impact)
- A more diverse RSI workforce, and in particular, more Māori and Pasifika researchers
- Flexible working conditions that enable researchers to progress their careers while supporting families and/or managing complex health needs
- Improve networking opportunities for postgraduates and ECRs across the sector, such that individuals' opportunities do not depend on their supervisor/project leader.

14. How should we include workforce considerations in the design of research Priorities?

We agree that new training and incentive structures are needed to ensure the RSI workforce has the skills and experience necessary to deliver on research priorities. In particular, we think that long-term national research priorities could inform postgraduate education and on-

the-job training, the creation of new research roles (e.g. research chairs) and opportunities (e.g. scholarships), and research impact evaluation.

We believe that the structure and content of **postgraduate education needs to be revised to focus on preparing students for research in multi-disciplinary teams, alongside Māori, public sector, and industry partners**. In our experience, co-supervision of students between universities and research institutes and integration of students into larger project teams provides students with valuable opportunities to receive this wider training. However, resourcing needs to be realigned to support co-supervision arrangements, so that students receive equitable support and supervision wherever they are located. We also think that research priorities could provide a basis for universities to design collaborative training programmes with government and industry entities. For example, universities could work with industry to create co-funded Masters and PhD projects on priority topics, enabling students to gain real world experience and skills that are attuned to future research needs. Universities could similarly establish internship programmes with government entities to prepare students to apply their research in a public sector context.

We also believe that robust training in how to be tangata Tiriti should be provided across the workforce, to improve research outcomes for Māori communities and reduce the engagement burden on Māori researchers. Departments should be required to ensure that all future graduates are equipped with the knowledge and skills needed to be tangata Tiriti in their chosen field.

Finally, if training and incentives are to be reshaped to deliver on research priorities, then those priorities need long term coherence to ensure that knowledge, skill sets, and researchers are not rendered redundant. While research frontiers will evolve over time and new priorities will arise, high level long-term priorities should be designed to enable institutions to invest their resources in training and capability development to deliver on those priorities.

15. What impact would a base grant have on the research workforce?

The effects of a base grant on the research workforce are hard to predict and will depend on how funds are allocated and evaluated, what is funded, and how research institutions respond to the new market. **We support the idea of using base grant funding to create permanent ECR positions and support career progression**. We see opportunities to improve diversity and research impact through dedicated funding for new Māori and Pasifika RSI positions and to resource relationship building with Māori and Pacific communities.

Given existing power dynamics within the RSI sector, we do not think it can be assumed that base grants will increase the number or stability of ECR positions, or workforce diversity, unless these outcomes are explicitly incentivised and monitored. If a base grant funds researcher salaries, then **institutions receiving funding should be evaluated according to workforce outcomes, including career progression and diversity metrics**. Furthermore, MBIE should conduct regular monitoring of the RSI workforce to identify and improve pathways for under-represented socio-economic groups.

We are concerned that if a base grant model ends up largely funding large established research institutions (see response to Q8), it will reduce the diversity of employment opportunities and career pathways, in turn impacting workforce diversity. The present project grant model funds researchers outside of traditional RSI institutions (e.g. in consultancies, NGOs, and Māori organisations) who contribute to transdisciplinary, impactful research projects. If base grants supplant project funding of researcher salaries, these less visible but important researchers may be squeezed out of the RSI sector.

We advocate a shift away from traditional publication-based metrics toward more holistic measures of research impact for determination of base grant allocations. A shift in evaluation metrics to capture broader outcomes for Aotearoa, Māori, and local communities would enable institutions and researchers to invest in relationship building, wider training, and applied science.

16. How do we design new funding mechanisms that strongly focus on workforce outcomes?

In our experience, the postdoctoral model is not working well in Aotearoa. There are very few postdoctoral fellowships and those that exist only fund part of a postdoctoral researcher's time due to the overheads model. Further, the lack of clear pathways for postdoctoral researchers to attain permanent positions leaves many post-doctoral researchers stuck on cycles of fixed-term contracts. Therefore, while we support changes to funding mechanisms to grow the number of ECR positions across the sector, **we argue that it is essential that all ECR positions have clear career progression pathways**. This should include creating ECR leadership positions within institutions. If MBIE increases the number of postdoctoral positions without clear pathways into permanent research roles, it will simply delay the lack of options available to graduates by a few years.

In our experience, improved ECR opportunities and pathways are needed for New Zealand-based, returning, and international ECRs. At present, government efforts to attract international talent to NZ are adding to the barriers for NZ-based ECRs, forcing some NZ ECRs to move overseas to find postdoctoral positions. We believe that rather than trading off NZ-based and returning candidates, there should be separate priorities established for each category. Equally, the lack of ECR opportunities available to non-residents create barriers to international students and postdoctoral researchers continuing their research careers in Aotearoa. NZ-based international researchers are ineligible for most postdoctoral fellowships, while paperwork and evaluation processes create barriers to including international students and postdoctoral researchers in project teams. If NZ wants to attract and retain international talent, then clearer career pathways need to be created for international ECRs, with reduced bureaucratic barriers.

We see opportunities for funding mechanisms to promote workforce equity and diversity by **improving options for part-time and flexible research positions and adjusting performance expectations to account for part-time work**. Many ECRs face the challenge of trying to launch their research career at the same time as starting a family, or juggle complex health and family care needs; yet research positions and evaluation systems privilege full-time researchers with no breaks in their academic record. While Cawthron supports staff through such times, we observe that this is uncommon across the rest of the

RSI sector—especially in academia (e.g., the PBRF system). Moreover, the costs are unequally borne by women, researchers from low-income and single-parent households, and Māori, Pasifika and immigrant researchers who have wider care responsibilities within their communities. We see opportunities for funding mechanisms to lead system-wide change toward more flexible working conditions by 1) enabling researchers to apply for fellowships and research grants on a part-time basis, 2) creating funding opportunities tailored to researchers with unusually high family or health care needs to promote researcher retention, and 3) revising performance evaluation models so that part-time researchers are not disadvantaged in grant/fellowship applications and career progression.

We also see opportunities to improve workforce outcomes through **improving funding mechanisms for internships, placements, and summer scholarships**. Such internships and scholarships provide emerging researchers with valuable skills and experience to guide their career development, and can open pathways for those who do not currently see a future for themselves in the RSI system. These positions are thus an important tool in improving equity and should be targeted at creating opportunities for underrepresented demographics. Importantly, if such positions are to improve equity in workforce outcomes, internships must be paid a living wage that reflects the cost of living in different locations, and must be sufficiently flexible for researchers with families and other mobility constraints (e.g. enabling them to locate in a local office, rather than move to Wellington).

Similarly, research funding mechanisms could promote ECR capability development by **supporting the co-supervision of postgraduate students between university departments and relevant research or industry institutes**. Many members of our ECR group have been co-supervised by Cawthron researchers and hosted part-time or entirely at the Cawthron Institute. These students have benefited from opportunities to participate in large project teams and learn about the career opportunities and skills required outside of academia, and in many cases have been offered positions at Cawthron after completing their studies. However, for co-supervision to be effective in delivering these outcomes, postgraduate funding mechanisms need to adequately support non-university institutions and staff to supervise students. New co-funded postgraduate scholarships and student supervision funding arrangements would support more widespread and improved co-supervision of students by non-university partners.

TE HANGANGA RANGAHAU | RESEARCH INFRASTRUCTURE

16. How do we support sustainable, efficient and enabling investment in research infrastructure?

For Cawthron ECRs, being from a regional institute can create issues with accessing research equipment, collections, and databases. Many of these resources are funded through the Government via competitive funding, but then owned by laboratories and not available to other research groups who may only require them for a one-off experiment. Two examples of the challenges confronting ECRs use of research infrastructure in New Zealand are described at the end of this section. A more centralized ownership and maintenance model would improve access for all scientists and enable scientists to answer research questions using the most up to date technology. Furthermore, a catalogue that lists where

scientific resources within Aotearoa are located would foster more equipment sharing and reduce redundancy in purchasing expensive equipment.

We suggest that large, nationally important research infrastructure could be managed by independent umbrella organisations to which individual institutes (or the crown on their behalf) contribute annual funding. In return, the independent umbrella organisations would provide an allocation of analytical time and support to the member institutions as well as organising national training initiatives, scholarships, and apprenticeships or placements/secondments for ERCs. Two models on which the umbrella organisations could be based (and extended) are the New Zealand Synchrotron Group and the allotment of beam time on the Australian Synchrotron, and the Senckenberg museum in Germany.

Furthermore, to sustain nationally significant research infrastructure, **education in using and managing the infrastructure is of key importance**. However, because much infrastructure is housed at and used by non-academic institutions, universities are not necessarily the best place to train researchers in managing, updating and researching collections and other infrastructure. For some fields, training could be delivered by educational institutes in collaboration with the research institutes who manage the infrastructure and therefore hold the relevant knowledge.

Examples of challenges ECRs experience in accessing and using research infrastructure:

1. Archived taxonomic collections are a fundamental research resource that underpins cutting edge fundamental and applied research. Unfortunately, in and of itself, maintaining such collections does not fit well within a ‘science stretch’ focused funding system. Universities and national museums have traditionally been seen as the caretakers and trainers for this fundamental information, with consultancies and applied research institutes the ‘*end of the pipeline’*. However, taxonomists are dwindling in these traditional institutions, reducing opportunities for student training. Consultancies and private research institutes are driving the majority of taxonomic research, yet they are not resourced to formally train researchers or manage collections in a manner that supports use as a public good resource.

2. In New Zealand, large research infrastructure is typically hosted by Crown Research laboratories, creating a gap between the education of future scientists and practitioners in that field. In some cases, researchers in host institutions limit access to researchers external to the organisation. This is particularly problematic for ECRs who have often not established the funding or mana to leverage access. One example of this issue is stable isotope laboratories in New Zealand. The recent closure of laboratories at the Universities of Waikato and Otago has created a gap between students/ECRs coming through universities and the two laboratories which are both located in Wellington within CRIs (GNS Science and NIWA). This makes it difficult for emerging generations of researchers to train or upskill in this field, while the CRI cost structures can make generating data prohibitive if you are external to the hosting institution.