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RESEARCH ARTICLE

Decolonising knowledge practices in biosecurity: Developing a reflective toolkit for more inclusive, equitable and respectful research

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Abstract

1. *Context*: Aotearoa New Zealand's biosecurity system, shaped by colonial and bureaucratic structures, tends to prioritise competition and financial management over environmental outcomes and community involvement. Successful biodiversity protection requires more cooperative, inclusive practices that engage local and Indigenous communities. Despite policies promoting knowledge sharing and collaboration, practical implementation remains a challenge.
2. *Approach*: We took an action research approach, involving iterative cycles of inquiry, reflection and refinement to explore inclusive biosecurity practices. Through interviews and co-analysis sessions with biosecurity professionals, including Māori researchers, we identified challenges and opportunities for integrating diverse knowledge systems. By synthesising empirical insights with theoretical frameworks, we co-developed practical tools to address these challenges and promote more collaborative approaches in biosecurity research, policy and practice.
3. *Findings*: We identified six dimensions of collective praxis to support those within the biosecurity system to work in a more inclusive, respectful, pluralistic and regenerative manner.
4. *Synthesis and application of findings*: To help practitioners reimagine their work practices, we developed a rubric with reflective prompts and gave it a more convenient and user-oriented format as a set of cards. These tools were designed to spark critical thinking and facilitate individual and collective self-assessment and priority setting (when used as a planning device). These support devices are

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intended for people working at the nexus between different knowledge systems. They were designed to help people with diverse cultural, disciplinary and professional backgrounds work better together and critically reflect on everyday practices that marginalise, discredit or disempower ways of knowing and doing that differ from mainstream scientific biosecurity.

5. *Conclusion*: This action research contributes towards decolonisation of the broader research culture, biosecurity system and biodiversity protection goals. The process is also valuable in adapting to changing contexts and highlights the power of reflection in reframing practices across a wide range of situations, beyond biosecurity, to foster collaboration and ensure more equitable decision-making.

KEYWORDS
Aotearoa New Zealand, biodiversity, biosecurity, decolonisation, knowledge practices, reflective aids, rubric

1 | INTRODUCTION

Aotearoa New Zealand (henceforth Aotearoa) is home to a unique diversity of plant and animal life, crucial to the identity of the country and its people (Craig et al., 2013). Aotearoa's geographical isolation has led to high levels of endemism, making many species vulnerable to invasive biological threats. This vulnerability is shared by entire ecosystems and primary production industries (such as mānuka honey).[1] Protecting native species, ecosystems and plant-based industries, while addressing the concerns that arise from biological threats is a central remit of the biosecurity system in Aotearoa which strives to keep unwanted organisms out and control or eradicate any that arrive. Biosecurity efforts to exclude or eradicate pests have shaped the country's surveillance of trade and tourism since the 1840s, although the term was not formally introduced until the 1993 Biosecurity Act (McLean & Shoebridge, 2010). While the biosecurity system in Aotearoa is often held up as an international exemplar (Boonstra, 2011), it needs change and improvement to address its colonial and capitalist foundations (Ehler et al., 2023; Prussing & Newbury, 2016).

The neoliberal, capitalist underpinnings of the biosecurity system in Aotearoa are visible in its competitive, siloed and bureaucratic structures which prioritise financial management over other social and ecological outcomes (Ehler et al., 2023). While the colonial origins of the science system have shaped the Aotearoa biosecurity system—establishing priorities, practices and power structures which favour Western knowledge and technocentric approaches—this poses challenges for integrating Māori[2] perspectives and knowledge (Kawharu, 2000; Kuru et al., 2021). Despite the clear mandate of Te Tiriti o Waitangi (1840)[3] (henceforth Te Tiriti) for all government agencies and research institutions to work in partnership with Māori, Māori perspectives, expertise and priorities remain underrepresented in biosecurity policy and management (Black et al., 2019; Lambert et al., 2018). While collaborative approaches are espoused, the allocation of resources and authority for aligned research is often insufficient.

Additionally, information sharing across the wider science system and community is hindered by a silo mentality and the compartmentalisation of mainstream science into separate disciplines. As a result, technoscientific ideas of risk and its management dominate the Aotearoa biosecurity system, and thus insights from Indigenous knowledge (Kuru et al., 2021; Lambert et al., 2018) and social sciences (Allen et al., 2014, 2018), which consider the social, cultural and relational aspects of biosecurity, are often overlooked. Recent research highlights the benefits of alternative (including Indigenous) approaches to forest conservation, such as better responses to biosecurity threats, climate change resilience and biodiversity protection (Lambert et al., 2018). While there is a growing interest in incorporating Traditional Ecological Knowledge into environmental policies (Gómez-Baggethun et al., 2013; Schlingmann et al., 2021), the selective use of Indigenous knowledges within Western institutions risks perpetuating colonial practices of delegitimisation and cultural appropriation (Moreton-Robinson, 2020; Smith, 2021). These systemic issues, including the prioritisation of economic values and the perpetuation of

[1]More broadly the term 'primary industries' includes the likes of forestry, horticulture, agriculture and apiculture, all of which are vulnerable to biosecurity incursions.

[2]The Indigenous people of Aotearoa.

[3]The Māori text of the Treaty of Waitangi is a founding document of Aotearoa signed by Māori rangatira/chiefs and representatives of the British Crown in 1840. Te Tiriti o Waitangi set out the terms by which the Māori chiefs envisioned a common future for Māori and British subjects on this land. Despite a recent attempt to undermine it, and in the face of historical breaches and inadequate reparations, Te Tiriti o Waitangi's current prominence within the country's legal framework and policy—including research and environmental management—stands as a testament to a prolonged struggle for justice and recognition (Mutu, 2019). Governance principles emphasising cooperation and partnership stem directly from Te Tiriti o Waitangi.

power imbalances, hinder effective collaboration and knowledge sharing (Sarpong, 2022; Whyte, 2017).

Local studies acknowledge that effective biosecurity for Aotearoa is fundamentally a collective endeavour which necessitates a more inclusive approach and authentic collaboration (Allen et al., 2018; Greenaway et al., 2022). Such collaborative intent is required to disentangle the fragmented and technocentric biosecurity system that contributes new forms of colonialism (MacBride-Stewart et al., 2023). Policymakers and agencies cannot therefore tackle the biosecurity challenges Aotearoa faces (namely, biodiversity loss and ecosystem degradation as a result of direct threats from pests and diseases) without substantial goodwill and collective action from Māori and a variety of key operational partners and associated stakeholders, including local communities. Indeed, similar institutional challenges have been noted in other colonised contexts (Apostolopoulou et al., 2021).

Decolonisation, understood here as the unmaking of colonial rule, is a far-reaching and all-encompassing enterprise that must account for centuries of systematic dispossession and insufficient reparations towards Indigenous populations who saw the transformation of their ancestral lands into modern settler-colonial states (Moreton-Robinson, 2020). This project specifically addressed how current knowledge practices, rooted in Western scientific traditions, continue to marginalise and invalidate Indigenous knowledges, preventing Indigenous peoples from fulfilling their spiritual and cultural obligations towards their ancestral lands. By reinforcing colonial hierarchies, these practices perpetuate the harmful effects of imperialism and positivist methodologies that have long silenced Indigenous voices and undermined their sovereignty (Moss, 2001). By looking at how we can incorporate both Māori perspectives and social science approaches meaningfully and appropriately, we therefore aim to challenge existing colonial frameworks that have historically dominated biosecurity management in Aotearoa. We acknowledge that decolonisation is a multifaceted and continuous process, and our contributions form part of an ongoing dialogue and action towards more inclusive and equitable practices.

This paper contributes to the ongoing efforts to decolonise biosecurity practices by exploring how to integrate often marginalised knowledge systems into mainstream scientific and operational discourse. Building on this context, our research developed a flexible, reflective toolkit designed to promote inclusive and collaborative biosecurity practices. The guidance we developed builds on: (i) our empirical evidence from talking to fellow researchers and senior practitioners working within or alongside the Aotearoa biosecurity system; (ii) international literature reflecting the experiences of growing communities of practice concerned about inclusive and collaborative means for addressing global challenges; and (iii) our own experience as social and operational researchers (working particularly within critical social science and/or participatory action research). While our toolkit was designed for those working in biosecurity within an Aotearoa context, its central tenets and the collaborative and iterative process we used to develop it are arguably adaptable to other practice areas and contexts.

1.1 | Research programme context and background

In recent years, the emergence of plant pathogens that seriously threaten native trees and forest ecosystems has become a major problem in Aotearoa. These pathogens endanger species of significant cultural and ecological value, particularly to Māori, as well as to biodiversity and primary industries. To address these urgent threats, the Biological Heritage National Science Challenge: Ngā Koiora Tuku Iho (BioHeritage) developed a targeted 3-year programme, Ngā Rākau Taketake—Saving our Iconic Trees (NRT) (BioHeritage, 2023). BioHeritage was a government-funded 10-year venture that drew together researchers and research partners from across the science system, primary industry and community groups, including Māori organisations. The NRT programme focused on accelerating research on pathogen-driven forest decline. A key objective was to integrate Indigenous knowledge into scientific research, aligning with the aspirations of Māori. Through partnerships with local tribes and by incorporating collaborative and multidisciplinary research and co-design with Māori at every level, NRT aimed to gain a deeper understanding of the ecological and social implications of pathogen activity and to inform effective solutions.

As part of NRT, the Postcolonial Biosecurity Possibilities project aimed to address the colonial and neoliberal legacies embedded in the biosecurity system (Harvey & McEntee, 2023). Guided by the values of BioHeritage (BioHeritage, 2019) including whanaungatanga (working together), kaitiakitanga (enabling environmental stewardship) and recognising mātauranga (local Indigenous knowledge) and mana motuhake (self-determination), we sought to support inclusion and collaboration through dialogue-based and nature-centred approaches (Greenaway et al., 2023). Six of our team of eight social scientists are based in Aotearoa while two are in the United Kingdom (Wales/Cymru).[4] The research reported in this paper is based on the work undertaken in Aotearoa, where, as tangata Tiriti (non-Māori New Zealanders, literally 'the people of the Treaty'), we come to the research with the intention of supporting our Indigenous partners while appreciating the myriad of contexts in which colonial oppression takes place.

1.2 | Value of reflection and reflective aids

Our epistemology for this research is grounded in reflection, enabling us to identify issues with current practice and opportunities to support changes in practice through the development of a reflective toolkit—a set of cards, and an accompanying self-assessment board, designed to facilitate playful and interactive self-evaluation

[4]While this paper originates from within an Aotearoa context, our colleagues in the United Kingdom have based their critical and reflexive contribution from within Wales/Cymru. Both our international collaborators have direct experience with forest-based research in Aotearoa. In this project they have been adapting and utilising the rubric cards (translated into Welsh/Cymraeg) within the Welsh context which has its own colonial history. As the focus of this paper is Aotearoa, it is not reported here, but it did inform wider understandings of biosecurity science and decolonisation.

and priority setting. Reflective aids, such as our cards, invite individuals to engage in critical self-reflection, contemplate the potential consequences of their actions, and devise strategies for behavioural modification (Mortari, 2015). By encouraging introspection, critical evaluation of decisions and contemplation of alternatives, they foster a more cooperative, respectful and inclusive work environment. Therefore, we propose that engaging with reflective practice questions can support members of the biosecurity system in identifying areas of bias and exclusion, understanding the perspectives of others, and formulating strategies for inclusivity and participation (Manton & Williams, 2021). This approach is, we argue, also useful for decolonising knowledge management and practice (Huria et al., 2017) as it promotes a more pluralistic environment in which diverse perspectives are valued and considered.

In the development and application of reflective prompts, rubrics, as instructional and assessment tools, can play a crucial role, facilitating substantive changes in practices and enhancing existing constructive ones (Allen et al., 2018). Through a structured framework, rubrics support individuals to pinpoint key focus areas, evaluate their performance and devise strategies for improvement (Allen et al., 2018; Allen & Tanner, 2006). Traditional rubrics provide detailed standards for different levels of performance, such as poor, satisfactory and excellent, whereas single-point rubrics emphasise defining what success looks like while allowing space for personalised feedback on both strengths and concerns (Fluckiger, 2010). This approach helps participants reflect on and improve their practice without feeling externally judged. Single-point rubrics can therefore encourage individuals and teams to examine their actions and decisions in a broader context and identify unique strategies for improving. Thinking more critically about actions and decisions in this way fosters greater self-awareness and understanding of the effect of actions on others. Thus, the value of reflective practice lies not only in its ability to improve individual and collective performance but also in its power to reframe how we approach biosecurity as a relational system.

2 | METHOD

2.1 | Scope and framing of this study

This paper presents one strand of research undertaken within the broader Postcolonial Biosecurity Possibilities project. The thematic foundations of the reflective toolkit were initially developed by the research team during the first year of the project, drawing on reflective inquiry, interdisciplinary collaboration and critical engagement with relevant literature. This empirical foundation supported a diverse range of contributions to the wider decolonisation effort over the 3-year programme. This work also informed a range of other contributions to the programme's aims, including peer-reviewed papers on fragmentation (MacBride-Stewart et al., 2023), relationality and positionality (Greenaway et al., 2023), and neoliberalism in biosecurity research (Ehler et al., 2023); a wānanga (seminar) exploring Te Tiriti-centric governance in scientific research; visual story maps (Levenson, 2023); and a Master's thesis addressing kauri dieback.

The provisional themes underpinning the reflective toolkit were then examined and refined through a series of engagements with participants. While participant contributions enriched the rubric with contextual insights and practice-based reflections, the final structure and language of the toolkit also reflect the team's synthesis of international literature and professional experience in participatory and decolonising practice. We outline these steps through a three-phase approach, noting that phases 2 and 3 overlapped in practice.

2.2 | Phase 1: Developing our approach

In the first year of our project, we focused on reframing biosecurity as a system of relationships amongst humans and the rest of the living world, rather than as a detached series of practices centred on containment and isolation. This reorientation involved observing the narratives that shape biosecurity and adopting a reflexive, participatory, and critical approach to facilitate collective and individual practice change.

During this phase, our efforts highlighted the necessity of guiding research, policy and practice to identify how inherited colonial biases manifest in our knowledge practices and relationships. As we engaged with these challenges, it became clear that developing a structured approach to providing ethical guidance was essential. We identified several key criteria that were deemed important for the successful implementation of this task, including respect, accountability, inclusivity, sustainability, relationality (including non-human relations), Tiriti-led practices, caring and responsibility. This foundation would later evolve into the development of a more structured rubric, which would document desired practices and allow for the self-assessment and refinement of these practices.

2.3 | Phase 2: Local participation through interviews, thematic mapping and co-analysis

In the second phase we sought to bring participants into the process. Building on their experiences, this phase aimed to explore current practices in biosecurity and to review and refine the foundational criteria established in phase one by exploring the factors that encouraged or inhibited the achievement of a more inclusive and pluralistic biosecurity system. This helped ensure that any outputs from our work were contextually relevant and practically applicable within the biosecurity sector.

Phase two, therefore, involved a cumulative series of interactions with research participants through which we explored their experiences of, and perspectives on, the broader biosecurity system and its knowledge practices. Ethical approval was gained via the Manaaki Whenua—Landcare Research social ethics process (ref: #2021/24 NK) and all participants provided written informed

consent prior to participating. Our participants were recruited from a subset of forest pathologists, ecologists, social scientists, kaupapa Māori researchers,[5] policy strategists, research managers, community advocates and biosecurity practitioners working on tree diseases within NRT. Initially, 10 participants completed an online survey. The survey was exploratory in nature, designed to inform the development of our interview guide, and included only open-ended questions. It was distributed within a limited network during a period of high sector demand, which may have contributed to the modest response rate. The results of the survey nevertheless informed the guiding questions for a series of hour-long semi-structured interviews with a further 12 participants.[6]

These interviews broadly explored factors that encouraged and/or inhibited the achievement of a more inclusive and pluralistic biosecurity system. Thus, we asked participants about their involvement in forest protection and their experiences of working in the biosecurity system—including their perspectives on who has access to infrastructure and resources, what is considered valuable knowledge/data, who holds this knowledge/data, how they are used and what they/we were learning from dealing with plant pathogens. We made sure to ask participants about the system's shortcomings and about ways to improve practices and navigate the system to overcome barriers.

The interview transcripts and open-text survey responses were manually coded and thematically analysed in NVivo using a mixed inductive and deductive approach. In an iterative manner, the identified themes and their associated codes were critically reviewed, assessed and analysed by members of the research team.

Participants described a range of inherited colonial biases shaping current approaches to tree care and biosecurity. These included fragmented, bureaucratic approaches that overlook the bigger picture, reactive decision-making and a lack of care for the people involved. Hapū (kinship groups) were often excluded from governance but expected to handle the consequences of decisions made by others, often with inadequate resourcing. There was frustration over the dominance of Western science, a lack of shared priorities with hapū and iwi (tribes), and power imbalances that sidelined communities. At the same time, participants also shared examples of improved practices—from connecting more directly with nature and fostering non-hierarchical relationships to building meaningful relationships with Māori. They also spoke of policy shifts towards resilience, equitable resource distribution and the value of community input to support collaboration and ensure diverse perspectives are included.

These themes were then shared, discussed and refined with our participants during co-analysis sessions in order to bring insights from our participants and our team together.

[5]Kaupapa Māori means a Māori approach, encompassing the incorporation of Māori knowledge, skills, values, interests, and priorities. Within scientific research, it signifies that Māori should define research topics and preferred methodologies, conduct the study, and ultimately benefit from the research outcomes.

[6]Five of the survey and interview participants were Māori, while the rest were pākehā (descendants of European settlers of Aotearoa) or tauiwi (foreigners).

2.3.1 | Mapping colonial legacies

Discussion during these co-analysis sessions led to the identification of a range of inherited colonial biases in biosecurity practices which are illustrated graphically in Figure 1. Drawing on our participants' insights, we worked through what was inhibiting and what was supporting good practice, as well as who has access to resources, infrastructure, knowledge and data. This broader perspective allowed us to explore where we could leverage change.

Key themes that emerged from these sessions reflected a larger structural view of colonial and neoliberal legacies that were affecting the biosecurity system including competition for funding, constraints to collaboration, and a lack of resources for engagement with local communities. Participants also described the dominance of biophysical sciences over social sciences, and Western ways of knowing over Indigenous understandings, values and priorities. There was significant concern about the limited consideration of Māori perspectives in biosecurity research and management, as well as a lack of direct funding of mātauranga Māori approaches and interventions. Many participants saw these factors as contributing to a tendency within the biosecurity system to consider Māori as an unpaid surveillance and management workforce, and as a freely accessible repository of data and samples (especially related to native plants). Disciplinary silos and fragmented responsibilities were also seen as hindering efforts to protect native biodiversity.

These themes were colour-coded according to commonalities expressed by participants that described recurrent issues embedded within the biosecurity system. Six colour-coded themes were provisionally assigned descriptive labels: competition, racism, reductionism, extractivism, working with Māori, and internalising respectful practices. The first four relate to structural issues with roots in the colonial history of Aotearoa (Hess, 2023), while the latter two reflect opportunities and practices that participants saw as enabling more inclusive and relational approaches. These groupings were developed to help visualise both systemic problems and areas of emerging change. Their framing was subsequently discussed and refined by the research team to link problematic habits and enabling practices to their associated root causes.

A key finding of the research has been that, while all those involved identified problems within the system that highlight elements of this colonial legacy, many spoke of their personal intentions to 'do things differently', with varying degrees of certainty around how to do so. Despite these challenges, some participants shared positive experiences of nurturing relationships with local Māori communities and of sharing data in meaningful ways to support development of place-based knowledge and action. Many also felt that reconnecting with nature and focusing their work around the needs of the natural environment helped inspire positive change.

Drawing on the insights of participants, the team identified two categories of good working practices related to Māori engagement which are illustrated in Figure 1. The first, 'working with Māori', includes practices such as investing in cultural capacity; exploring the

FIGURE 1 A mapping of inherited colonial biases and potential opportunities for decolonising biosecurity practices. This colour-coded diagram draws on participant insights and literature synthesis to show how access to knowledge, data and infrastructure shapes suitable practice.

stories of the land, people and species involved; and valuing Māori contributions to knowledge, which have often been ignored or underestimated.

The second, 'internalising respectful practices', recognises that biosecurity practitioners and researchers—including non-Māori teams—can adopt more respectful (read inclusive and relational) ways of working, even when not directly partnered with Māori. These practices are not in themselves decolonising, but can meaningfully support efforts to address structural inequities and reflect Te Tiriti obligations when used as part of a wider commitment to change. These practices aim to foster systemic change, not as a performative response to external scrutiny, but out of recognition of the structural issues that are hindering the effective protection of native species and ecosystems. Suggested practices within this category include keeping in mind the ultimate goal of forest protection, ensuring the well-being of oneself and others, and valuing community input throughout biosecurity efforts.

By the end of this phase of research, we had gained a deeper understanding of the biodiversity context and the challenges and opportunities facing decolonisation within the Aotearoa biosecurity system.

2.4 | Phase 3: Developing a rubric

While Phase 2 centred on gathering insights from participants across different roles in the biosecurity system, our third phase focused on developing a rubric to support practices which address the inherited colonial biases identified in phase 2. To ensure our work was robust and grounded in both local and broader perspectives, we drew on (empirical and theoretical) insights provided by our participants and by global communities of practice in various sectors addressing similar relational challenges. These contributions supported our decision to use a single-point rubric, promoting self-assessment and continuous learning. They also helped the research team refine, merge and rename the criteria identified in phase 1. In addition, these global practice guides helped identify indicative examples of good practice, not only to measure performance against each criterion but also to encourage teams to reflect on what good practice might look like in their specific contexts. Finally, the literature reinforced the importance of shared direction and reflective practices, highlighting the need to first recognise and align team values and actions, ensuring members work towards common goals while continuously adapting and learning.

Figure 2 represents a non-linear progression from entrenched colonial legacies towards more inclusive and collaborative workplace practices. The staggered layout and curved pathway reflect the idea that these shifts are aspirational and require active, ongoing work rather than simple substitution.

2.4.1 | Key dimensions of practice

The six key dimensions—shared direction, inclusion, accountability and trust, relationality and regeneration, care, and reflection and reflexivity—highlight areas where significant progress can be made to foster better practices within teams and by individuals working in the biosecurity system. We include a brief literature review to offer a shared reference point for understanding each dimension and to support the development of best practice examples. Creating a shared direction is crucial for collaborative endeavours, amplifying success, increasing participation and bridging the divide between project leaders and teams. Practitioner-driven change models often include developing a vision and desired outcomes (Doten-Snitker et al., 2021). Recognising partners' goals and values, especially in biosecurity, is crucial. Shared values foster common ground, while diverse perspectives enrich the process. Facilitated processes address this plurality (Apgar et al., 2011), enhancing engagement, commitment, and helping to tailor communication initiatives. A collective way forward helps stakeholders collaborate, envision holistic changes and understand their contributions to common goals.

Diversity and inclusion are important because they can help promote innovation, creativity and problem-solving (Allen et al., 2018). Teams with diverse backgrounds, experiences and perspectives are better equipped to tackle complex problems and develop novel solutions. By combining individual perspectives, resources, and skills, the group creates something new and valuable together—often producing an outcome that is greater than the sum of individual parts (Lasker et al., 2001), benefiting biodiversity protection (Kuru et al., 2021).

In interdisciplinary or trans-disciplinary research teams, accountability and trust are paramount (Palmer, 2023). Trust, which evolves over time, is essential for balancing power and voice within teams. It often begins with scepticism, transitioning to functional or critical reflective trust as different perspectives are better understood. This trust development is key to partnership, equity and shared power (Dare et al., 2014; Horton et al., 2009). Accountability is closely tied to governance in research projects, involving practices such as research ethics oversight, partnerships regulation, data management and dissemination (Mulumba et al., 2021). Governance structures can aid decolonisation by returning some control of

FIGURE 2 Moving from challenges and opportunities to decolonise biodiversity protection (on the left), towards better workplace practices in biosecurity (on the right). The six key dimensions of practice are not directly aligned but instead mapped as aspirational shifts along a reflective journey.

research to the community, allowing greater deliberation over research problems and methods.

Relationality and regeneration are also important concepts in decolonisation, linked to the Indigenous notion of the interconnectedness of all beings and things (Gram-Hanssen et al., 2021). The separation and domination of nature by humans is a colonial legacy, counteracting relational approaches. Exploring decolonisation and relationality can underpin transformations as research engages with the notion of 'right relations', interpreted as fulfilling responsibilities in any relationship, whether it involves other humans, other species, the land, or the climate (Gram-Hanssen et al., 2021). Regenerative sustainability builds on similar concepts, integrating recent understandings from science, Indigenous knowledges and practices, different ways of knowing, and inner and outer dimensions of sustainability necessary for systemic transformation (Gibbons, 2020).

Promoting care and hospitality in inter- and trans-disciplinary collaborations is essential for building trust and critical emancipatory knowledge (Staffa et al., 2022). Leaving these collaborations to chance or individual choice is inadequate. McKercher (2021) emphasises the need to establish and uphold safety, especially with groups that have experienced trauma or historical neglect. Without safety, participation, inclusion, and creative expression become challenging, if not unattainable. Success in collaborations is more likely when trust-building activities, such as nurturing cross-sectoral and cross-cultural understanding, are committed to within ongoing relationships (Bryson et al., 2006).

The likelihood of a collaboration staying together hinges on its demonstrated success (McLean & Behringer, 2008). Recognising and adjusting a group's efforts is fundamental to iterative participatory process design (Bryson et al., 2015). Continuous reflection and reflexivity ensure that collaboration remains adaptive and responsive to changing circumstances. Reflection identifies problems and solutions, while reflexivity reveals underlying assumptions that may need to be challenged (Bolton, 2010). Evaluative tools, such as rubrics, can help assess and enhance collaboration dynamics (Allen et al., 2014), enabling continuous improvement and adaptation for individuals and teams.

Drawing on both this literature and the local knowledge of participants, the team then developed indicative examples of good practice for each dimension of practice, providing clear and practical

TABLE 1 Indicative examples of good practice associated with the six key dimensions of practice.

Key dimensions of practice	Indicative examples of good practice
Shared direction	Team members are actively involved in developing a common vision and a plan for reaching it. Group discussions highlight (shared and individual) values and aims. People are empowered to have a voice. Team members recognise how their different skills, backgrounds, perspectives and contributions add to the project. There is strong leadership that helps the team to collectively set and reach their aims.
Inclusion	Team members use language in a mindful and inclusive way. Team members actively seek a range of perspectives by bringing together people with different backgrounds and abilities. Team leaders include and resource different people and approaches meaningfully and equitably. Project coordinators promote diversity in leadership. Research activities are designed and conducted in a manner that is respectful of the land, species, and local communities with whom we work or who are affected by our work.
Relationality and regeneration	The relationships between individuals, communities and the living world are acknowledged and valued. The team recognises relationships of mutual care and interdependence between humans and nature. The team acknowledges the importance of such connections to individual and collective well-being, sense of belonging and identity. The team strives to create resilient ecosystems and communities. The projects and interventions designed provide opportunities for people to reconnect with the land they inhabit.
Accountability and trust	Relevant project information is available in a timely manner and is shared in an accessible language and format with team members and research partners. The decisions and actions taken around specific projects are consensual and fair. The project aims, processes, and decision-making practices are transparent, and take into consideration socio-cultural values. Trust and reliability between team members and research partners are actively earned and not taken for granted.
Reflection and reflexivity	The team critically reflects on how their preferences, assumptions and partialities shape their work, and strives to counteract their influence. Team members recognise where the power and privilege lie within their project and implement corrective measures. Team members regularly check with each other about how they are going collectively and individually. Lessons learnt through self-critique and reflection are readily applied, and planning and milestones are adjusted accordingly.
Care	Caring about each other while co-designing research is common practice. Hospitality is never left to chance or individual discretion. The team works hard to create and maintain a safe space for all project members and partners, particularly those who have historically been excluded. Care is all-encompassing and demonstrated through the ways we work with local communities, species, biological samples, data, systems, etc.

guidance on what success looks like. These indicative examples of good practice were then discussed and refined with groups of our participants during two reflection sessions, resulting in the practices included in Table 1.

Having collaboratively identified the six key dimensions of practice, and associated indicative examples of good practice, for our single-point rubric, the final step in the development of our reflective toolkit was to establish a self-assessment scale to allow users to reflect on their progress and plan next steps. For our scale we settled on a continuum from aspiration—'we are thinking about this'—to mastery—'we are becoming good at this', with 'we are trying to do this' as a mid-point.

2.5 | Phase 4: Finalising the toolkit

During the process of iterative collaboration that led to the creation of our toolkit, we found that a set of cards, each representing a key dimension of practice linked to indicative examples of best practice, provided a helpful and user-friendly way of presenting the rubric. The cards included prompts that could be read, reflected on and adapted by individuals or teams, supporting them in assessing what they were doing well and identifying areas for improvement.

We present here the resultant set of cards, each named in both English and Te Reo Māori, the official spoken languages of Aotearoa (Figure 3). The back of each card lists the indicative good practices related to the corresponding dimension, designed to prompt deeper reflection and discussion (Figure 4). To further explore the toolkit's adaptability and relevance across different contexts, we also translated the set of cards into Welsh/Cymraeg for use by our UK research colleagues (operating in a Welsh context), allowing them to engage with the dimensions of practice in the local linguistic framework.

2.6 | Using the reflective toolkit

By highlighting the rubric's key criteria as dimensions of practice on a set of cards (small, mobile, and tactile devices) we allow for flexibility in how and where individuals and teams can interact with them. These cards can be used individually, or as a set, and revisited multiple times for either self-reflection or group discussions. This engagement can be casual, or part of a structured self or group assessment or priority setting process guided by the accompanying rubric self-assessment board (Figure 5).

To support their use, we provided a guide and a QR code link to further information about the tool (as well as a digital version of the tool) inside the box containing the cards (Figure 6). This guide encouraged participating individuals or teams to determine how they wished to use the cards, reflect on and assess their performance and connect with the authors.

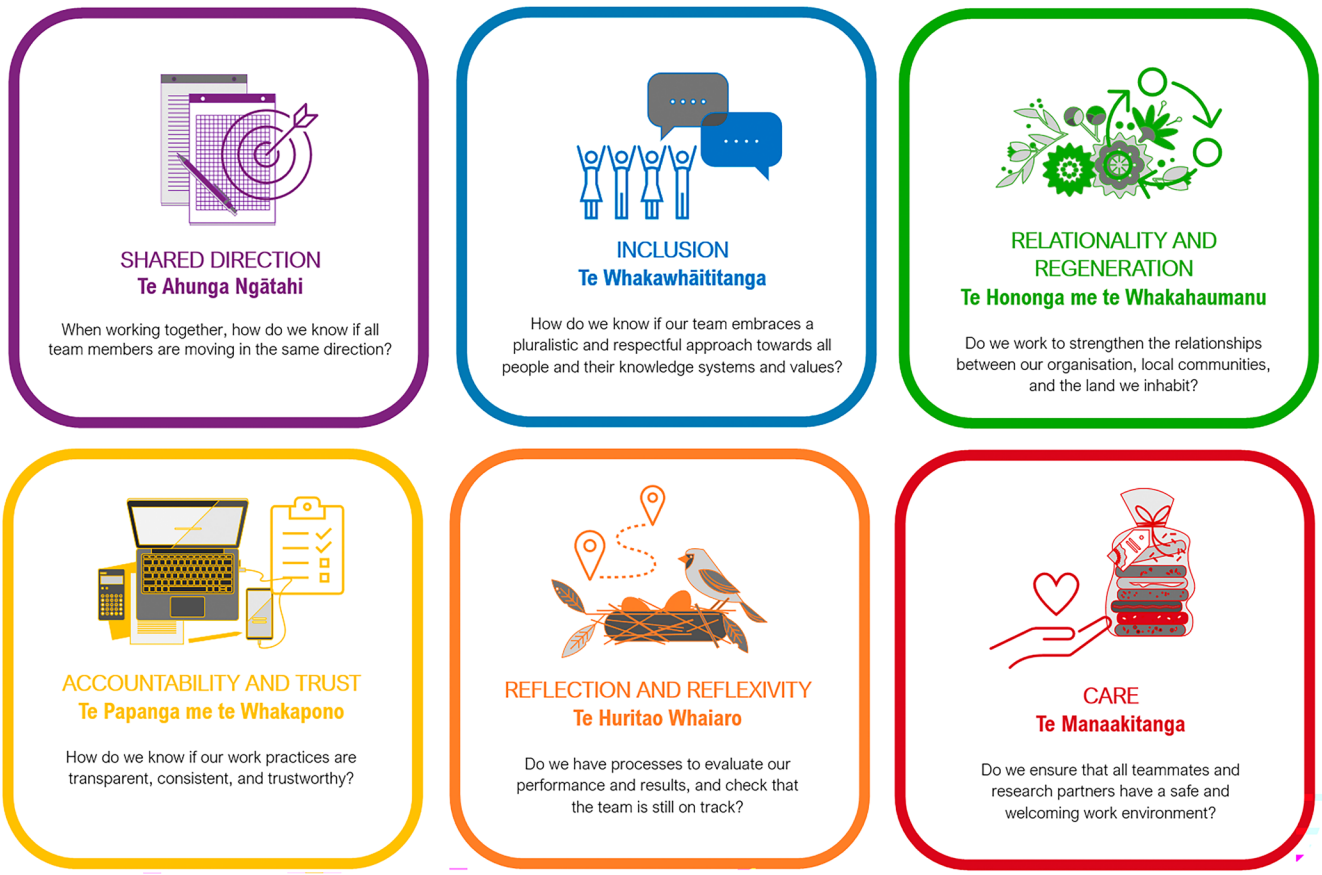

FIGURE 3 The front side of the cards showing the six identified dimensions of practice.

FIGURE 4 The reverse side of the cards displaying indicative examples of good practice.

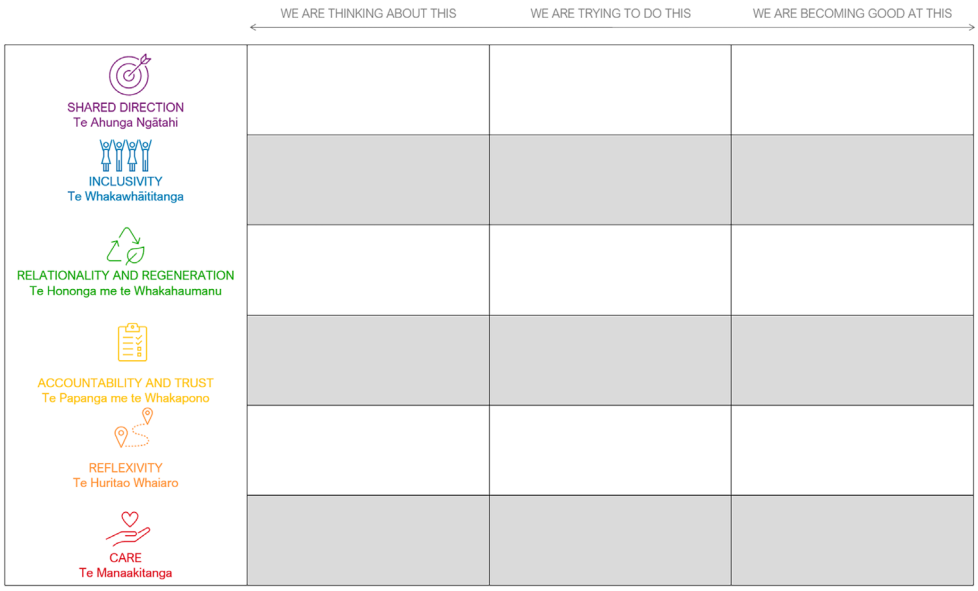

FIGURE 5 Self-assessment board.

Some of the groups we have tested the cards with chose to assess themselves using the self-assessment board, while others relied solely on individual reflection and/or group discussion as they engaged with the cards. Some used the cards to reflect and gain greater clarity on what they did well and what needed improvement, while others used them to prompt reflexivity on why their behaviour around particular practices differed significantly across various projects and organisational contexts. In this way, individuals learnt about themselves, and teams learnt from and about each other.

FIGURE 6 Decolonising knowledge practices toolkit.

In all the cases described, we noted that identifying effective work practices is a reflective process that can be initiated individually or collectively. When using this toolkit in a group, the priorities to be addressed, the adequacy of current biosecurity practices, strategies to improve them, deadlines for reassessment, and other relevant criteria should, ideally, be discussed collectively and decided by consensus. Thus, we contend that the tool's flexibility is one of its greatest strengths.

3 | DISCUSSION

The reflective toolkit is more than an isolated intervention; it is part of broader decolonising initiatives aimed at systemic change. By fostering critical self-reflection and inclusive practices, the toolkit contributes to the systemic shifts needed to decolonise the biosecurity system, aligning with efforts to integrate Māori leadership and perspectives, and promoting equitable and sustainable biodiversity protection.

After a 3-year joint investigation, we do not claim to have uncovered universally relevant criteria that solve the myriad of obstacles and difficulties confronting those wishing to decolonise knowledge practices within Aotearoa, or any other, biosecurity or biodiversity protecting system. Such criteria must be customised to the specific contexts and individuals involved. Our main contribution has been to enhance understanding of the challenges associated with collaboration across knowledge systems—especially under colonial structures that prioritise certain perspectives while silencing others—and to draw participants into reflective practice. By identifying key areas of practice and prompting reflection and discussion, our toolkit encourages more inclusive and collaborative work practices.

Developing a reflective toolkit to help shift the performance of the Aotearoa biosecurity system towards more inclusive and diverse knowledge-making practices is not a one-off process. We have documented how a toolkit can be developed and used for different individual or team initiatives, and this is now being taken up in different settings within Wales. Our process emphasises an iterative approach that can be engaged with at different points in time and adapted to suit the needs of the group or individual. In doing so, we have developed and shared the toolkit in different contexts, involving different organisational cultures and interdisciplinary mixes.

Our discussions and reflections support calls for normalising a more pluralistic approach to working within the Aotearoa biosecurity system, one that includes a range of values, knowledges and activities highlighting relationships and the effects of knowing the world relationally (Watene, 2016; West et al., 2020). Avoiding the privileging of one perspective over another aligns Indigenous worldviews and approaches to the increasing inclusion of multiple cultural and ecological values (Cooper et al., 2016; Kawharu, 2000). These approaches are also evident in contemporary sustainable and stewardship-oriented approaches (Hill et al., 2021; Tadaki et al., 2022).

A key contribution our toolkit provides in the context of biosecurity is its encouragement of reflection on the processes of biosecurity research, practice, and engagement, and their impacts on the people involved. As noted in other literature on biosecurity, there are often few opportunities for people to reflect on what they are doing, to consider the implications of their actions and to understand how their activities are perceived by onlookers (Marzano et al., 2020; Porth et al., 2015).

Reflecting on our own team involvement in forest protection and our evidence gathering with researchers, policymakers and

practitioners, we note that our toolkit is for people who already feel the need to work in a different manner that acknowledges our Te Tiriti obligations. Without the desire to change, there is little that a set of cards can do to support transformation. Through our work, we found that many participants were indeed open to exploring different ways of working and were eager to consider approaches that align with these obligations. It is therefore notable that people who are more open to what they can do as individuals or in smaller work teams are more likely to use these reflective prompts (Kaine & Wright, 2022) than those who feel the responsibility and ability to change lies solely at a higher level of governance.

However, reflective prompts are not a panacea even for those seeking change, and their effectiveness depends on several factors. The timing and presentation of these prompts, for instance, can impact their efficacy (Super et al., 2021). If perceived as adversarial or judgmental, they may be met with resistance. Moreover, individuals may lack the necessary skills for effective self-reflection (Super et al., 2021). As Sitzmann and Ely (2010) note, it is beneficial to provide reflective prompts regularly when seeking to change practices. However, we would discourage using this toolkit during a personal grievance process, when major organisational change is happening, or when Māori or other Indigenous leadership already have a process in place that this might detract from.

Engaging with this reflective toolkit may prove challenging for some, as it requires individuals and teams to commit to self-reflection; therefore, creating a supportive and nurturing team environment is crucial (Huria et al., 2017; Manton & Williams, 2021). In contexts of change, caring for one another plays a pivotal role in facilitating this process of growth and transformation (McKercher, 2021). The reflective tools we have developed are intended for those who are willing to engage in this journey and to empower participants to drive change within their spheres of influence.

4 | CONCLUDING THOUGHTS

In this research, we have formulated ideas for addressing colonial biases and worked with participants to develop critical self-reflection. Thinking critically about what we do and how we do it can help biosecurity researchers and practitioners (amongst others) to assess whether their work is inclusive, representative and just. Adopting self-reflective practices can identify areas where colonial biases and imbalances persist and make necessary changes. Guided reflection, based on rubrics, can be used to support discussions around practical performance between colleagues, promoting critical thinking and collaboration. As part of these approaches, it is important, as researchers and practitioners, to embrace diversity of perspectives and values, work with communities, consider ethical implications, and use methods critically and reflexively to address colonial biases. The reflective toolkit presented here, along with the collaborative approach used to develop it, was created to contribute to enabling this shift in biosecurity and, if adjusted for differing national, environmental and cultural contexts, it may also prove helpful in other settings and fields seeking to decolonise knowledge practices. However, it is crucial that the reflective practices promoted by such tools and processes are complemented with additional decolonising initiatives, including, in an Aotearoa context, investment in Māori leadership and Te Ao Māori initiatives, training opportunities, and appropriate policy development to ensure a comprehensive approach to decolonising knowledge practices. Overcoming challenges, such as those faced within the Aotearoa biosecurity system, will ultimately require collaborative efforts, mutual support, and a commitment to growth and collective learning, in order to ultimately embed a pluralistic and inclusive cultural foundation within this system for the benefit of future generations.

AUTHOR CONTRIBUTIONS

All authors (Susanna Finlay-Smits, Maria Blanca Ayala, Will Allen, Andrea Grant, Alison Greenaway, Sara MacBride-Stewart, Liz O'Brien, & Katja-Soana Ehler) are members of the Postcolonial Biosecurity Possibilities project. Susanna Finlay-Smits*, Maria Blanca Ayala* and Will Allen* developed the reflective toolkit and planned and drafted the paper with help from Andrea Grant. All authors contributed to the wider project design, gathering and analysis of the data from participants in the biosecurity community, and provided critical input and feedback on the tools developed. All authors discussed the results and commented on the manuscript. (*equal lead authors).

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Due to the sensitivity of the research topic and the type of data collected, it is not possible to make the audio recordings or transcripts of the workshops and interviews publicly available. We guaranteed anonymity and confidentiality to our participants in compliance with the ethics approval granted by Manaaki Whenua—Landcare Research (#2021/24 NK).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Appendix S1. Caring for taonga (treasured) trees: creating a system of biosecurity practices led by Te Tiriti o Waitangi, which actively respects and includes a plurality of perspectives.

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