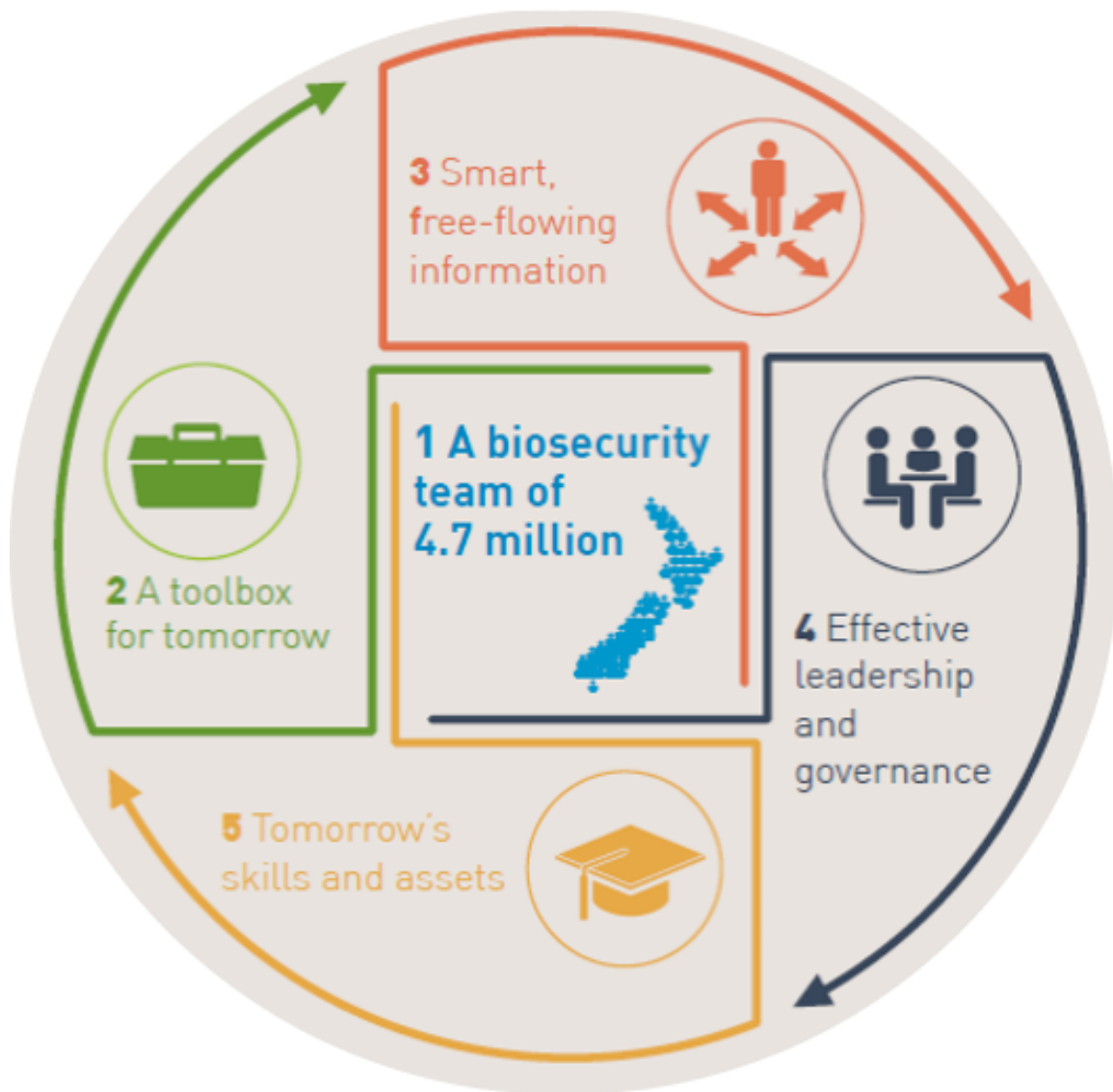


BIOSECURITY 2025



WORK PLAN



Strategic Direction 5

Tomorrow's skills and assets

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1. Introduction

Biosecurity is the exclusion, eradication or management of pests and pathogens that pose a risk to the economy, environment, cultural and social values, and human health.

This Action Plan is targeted at ensuring New Zealand has the capacity and capability necessary to protect New Zealanders, our way of life, our natural and productive resources and our biodiversity from the harmful effects of pests and pathogens. These threats are not limited to only incursions of new pests or pathogens. They can also arise when changes in local conditions (e.g. change in land use, climate change, translocation) result in existing exotic and/or native pests or pathogens having a harmful effect.

To be effective, the biosecurity system must be supported by enough people with the right knowledge, experience and skills at every level and across every function. To ensure this, we will understand the capability needs of the system, invest in the development of the current workforce, and plan for future needs and sustainability. This will include increasing the profile and attractiveness of biosecurity as a career pathway, incorporating biosecurity into primary, secondary and tertiary education, supporting life-long learning, and enabling people to develop system-wide biosecurity careers.

High-quality infrastructure is crucial to effective biosecurity risk management and needs to be well resourced, maintained and accessible. This infrastructure includes laboratories, taxonomic collections (and associated systematics expertise), databases, information technology systems, and policy infrastructure.

Strategic Direction 5: Tomorrow's skills and assets are focused on ensuring our biosecurity system has a capable and sustainable workforce and world-class infrastructure.

Development of the work plan

This work plan has been developed by a working group made of people drawn from across the biosecurity system and beyond. The working group met eight times between August 2017 and February 2018 and worked through a process to identify:

- What success looks like for each of the outcomes identified in the strategic direction statement
- Where the system is currently placed to achieve these outcomes
- What actions are necessary to take for that current state to achieve the described success

The actions were then reviewed in their entirety, to remove duplication and consolidate into five core delivery areas: Implementation mechanism, understanding the system, capability development programme, asset development programme and partnering with Maori. It's important to note that, in some instances, one action may deliver to achieving more than one outcome.

The working group identified and applied a set of key assumptions, to frame their discussions and thinking as they developed the work plan (see page 4)

Implementation considerations

A number of the initiatives identified in the work plan are already being undertaken, in part or full, by other participants in the biosecurity system – whether for the purposes of delivering biosecurity system outcomes or other purposes (for example, there are already wider initiatives being undertaken by managers of biological collections to improve their interoperability).

The implementation of this Action Plan provides context for, and the opportunity to leverage off, these actions, in respect to delivering the outcomes of the Skills and Assets strategic direction for Biosecurity 2025. The incorporation of these existing actions or initiatives within the Action Plan may also provide an opportunity to enhance their value beyond their current purpose. Work already planned or underway should continue, and this plan shouldn't stop anything progressing that is consistent with the vision for 2025.

It will be important in implementing the plan, that a collective focus is taken on building the capabilities and assets the system requires to minimise duplication and overlap. This will ensure that scarce resources are best targeted at the levels or layers of the system best placed to deliver the desired outcomes.

2. Assumptions

Skills – The biosecurity workforce is made up of enough people, with the right knowledge and skills, to meet our current and future biosecurity challenges.

1. Applies to skills required across whole of system – pre-border, border and post border elements
2. Applies to opportunities across all levels of education (e.g. early childhood, primary, secondary, tertiary, on the job), includes education system provision for skill-building to be applied offshore (e.g. overseas students coming to NZ to learn and take skills back)
3. Workforce, interpreted in the broadest sense, therefore includes:
 - People employed in official biosecurity roles (e.g. central and local government, NGOs)
 - Volunteers active in biosecurity (e.g. Kaitiaki, community groups)
 - People employed in biosecurity-related sectors (producers, growers, importers, etc.)
 - Scientists and teaching staff in universities and other academic centres
 - Prospective future workforce – students (primary, secondary and tertiary)
4. New Zealand has a leadership role internationally in building biosecurity capability – as a “Biosecurity Centre of Excellence” (including Mātauranga Māori, applied expertise, system leadership)
 - Building capacity locally and offshore to apply knowledge offshore for the benefit of NZ and other countries
5. Experts include those from a wide range of related disciplines (e.g. Mātauranga Māori, health, natural and social sciences)
6. Māori will be part of the decision-making across all parts of the system
 - Notification early [of any activity that affects Māori interests]
 - It is important that Māori have possibility to engage in decision-making processes early

Assets – Robust, resilient and enduring infrastructure supports biosecurity system functions.

1. Assets include
 - People (capacity and capability)
 - Facilities (e.g. labs, collections – native and non-native, quarantine, research institutions)
 - Equipment
 - Supplies
 - Information
 - Policy, legislation
 - Infrastructure – roads, processors, pack houses, farms, etc.
 - Cultural authority agreements
 - Taonga species
 - Maori ecological knowledge, including pathology and taxonomic knowledge
 - Relationships (local, national, and international)
 - International agreements
 - Networks
 - Teaching and training capability and capacity
2. Systems that help us anticipate emerging risk are included
3. Refers to the whole system – assets that enable system to keep things out, to anticipate, to manage (pre, border, post)
4. Involves collaboration between and across agencies, industry, councils, communities and Maori
5. Māori will be part of the decision making across all parts of the system
6. Māori assets are respected with clear protocols for use
7. Responsibility to ensure Wai 262 will be part of discussions and taken into account
8. Decisions are made on the best authoritative evidence, with consideration on impacts on and benefits to human health

3. Current state and priority areas for attention

New Zealand's biosecurity system is made up of many interlocking parts, and this is particularly apparent when considering the skills and asset requirements of the system.

Each of the parts have particular or specific needs, and each plays specific and important roles in ensuring the successful functioning of the system. The 'failure' of any one part is not only an issue for that particular area of the biosecurity system, but also creates stresses (and associated costs) on other parts of the system. In effect, vulnerability in any one area reduces the system's resilience, and therefore the ability of the system to manage the risks that pests and pathogens pose to the economy, environment, cultural and social values, and human health.

This work plan identifies core areas of focus and action to address current issues and potential weaknesses in the capability and assets of the biosecurity system. The successful implementation will deliver a more resilient and sustainable biosecurity system that is owned by all and delivered by all, with each participant willingly taking on and committing resources to achieve successful outcomes.

The implementation of the work plan will involve collaboration and partnership across and between agencies, industry, community and Maori.

Information gaps

The capability and capacity needs of the biosecurity system are not well understood. This is increasingly leading to a situation where significant skill and infrastructure gaps are beginning to undermine the effectiveness of New Zealand's biosecurity system.

The work plan therefore focuses on improving the understanding of what the skill and infrastructure needs and gaps are in the biosecurity system. On the basis of this, and addressing some known gaps (e.g. career development, education provision, management of biological collections, Maori capability and capacity), the plan sets out programmes that will ensure the biosecurity system skill and infrastructure needs are provided for on a long-term, sustainable basis.

Working in Biosecurity – building capability

There is currently poor understanding of the breadth and scope of opportunities offered by a career in biosecurity. Improving the profile of biosecurity, and biosecurity career opportunities, in schools, tertiary education providers, and the wider work force, is needed to attract and retain the wide set of skills, expertise and experience the system needs. This will require the development of

- Improved advice and availability of biosecurity career information
- More, and better targeted, biosecurity-focused education and training tools, resources, courses and qualifications
- New and alternative pathways to enter education and the workforce, that reflect the need for wider and different skillsets, and cultural backgrounds and preferences
- Understanding of the role Māori have in the biosecurity system, and how to work with Māori to get better biosecurity outcomes
- A nationally available professional development framework, which incorporates appropriate core skills and knowledge, and professional recognition processes
- Corporate governance and senior leadership capability in biosecurity
- Opportunities for international professional engagement and learning
- Mechanisms for recognising and highlighting success

The working group has particularly identified that there are key skills and expertise shortages looming in critical areas which need attention now – for example, bio-informatics, ecology, plant pathology, entomology, taxonomy (terrestrial, fresh-water and marine), and epidemiology.

Although some progress in addressing these capability gaps can be achieved through smarter use and deployment of existing resources, long-term sustainability requires much clearer and more direct resourcing of these critical areas. This will involve clear direction coming from government and industry leaders on their needs, and clear commitments

to support the needs being addressed – for example, through setting of policy priorities for Crown Research Institutes such as the Strategic Science Investment Fund (SSIF) process, the Tertiary Education Commission, the New Zealand Qualifications Authority, agency strategies, and Government Industry Agreement (GIA) commitments.

Building resilient system capacity – infrastructure, systems and frameworks, and networks

Infrastructure needs

There is a limited amount of system-level information on the state of current physical infrastructure and systems, and whether they meet New Zealand’s current or future needs. This means that a stock-take and needs assessment to inform a longer term infrastructure and system development programme are priority actions.

However there are a number of areas where sufficient information is available for action now: putting our biological collections on a more sustainable footing, addressing the constraints to maintaining an up-to-date New Zealand Organism Register (NZOR), and providing for development of Māori infrastructure and needs for asset management.

There is a notable lack of infrastructure to support marine biosecurity activities (e.g. slips big enough to properly inspect and/or treat vessels). This is currently resulting in less than satisfactory management of risks – for example requiring a vessel to move to another region and therefore potentially exacerbating any identified risks. Although not quantified, the working group considers that a lack of Post Entry Quarantine (PEQ) facilities may also be impacting on the opportunities for new or improved areas of economic activity.

It is anticipated the outputs of the Strategic Direction 3 work plan will also address some of the critical information system needs (e.g. establishment of data standards).

Collections

Biological collections are a critical strategic asset in New Zealand’s biosecurity system. Our biosecurity is predicated on our ability to tell native from non-native organisms. For example, in a response, time is often critical, and access to authoritative, robust and up-to-date scientific information is essential.

The Royal Society of New Zealand (RSNZ) National Taxonomic Collections Report found there was inadequate and overall declining support for the national taxonomic infrastructure (research scientists, curators, collections etc.) and that the erosion in investment has resulted in the loss of national capability in specialised expertise. Wai262 recognises Maori rights in respect to taonga species (although the Crown has yet to respond to the tribunal’s findings). With the exception of a few examples, the cultural authority over taonga species in biological collections is also not well provided for.

To address these issues it will be necessary for New Zealand to

- Invest in taxonomic expertise and curation
- Ensure accessibility of data and knowledge through investment in infrastructure and people
- Provide stewardship or kaitiakitanga (long term protection) of collections and data
- Ensure that the skills and assets are considered in a NZ-wide setting – with the distributed network of expertise, along with the collections and databases, seen as a national resource of fundamental importance
- Ensure that iwi and hapū inform how taonga species held in biological collections from their rohe are curated and used – in respect to biosecurity and broader cultural and environmental purposes

The immediate priorities for building biological collections are:

- Cataloguing, registering and data-basing our current collections into digitally accessible formats – and ensuring the databases are inter-operable so all have access to all of the information about organisms present in NZ
- Reversing the decades-long decline in support for taxonomic research in NZ, with a clear focus on NZ-wide priorities
- Bringing in new, skilled practitioners, while also supporting the taxonomic experts we currently have who are significantly under-utilised because of funding constraints

This will require getting New Zealanders, in particular decision-makers in government, industry, community and Maori, to recognise the importance and urgency of addressing these issues. This will undoubtedly involve finding new ways to support taxonomic research, collections and databases. This will include addressing the funding disconnect between the short-term output priorities of departments and agencies, and the long-term input investment priorities of those providing the main funding to the collections' infrastructure.

Policy and regulatory framework

The policy operating environment is changing – becoming more diverse and sophisticated – with industry (both companies and representative organisations), communities and Maori becoming more aware of the need for, and their respective roles in, managing biosecurity risks in their sector as part of an integrated system.

The working group considers it timely to undertake a comprehensive review of the regulatory and policy framework, to assess how well it supports the New Zealand biosecurity system – both now and into a future, increasingly-globalised world.

In this context there is a need to address some known limitations in the current framework, to mainstream biosecurity into the wider legal and regulatory infrastructure, and provide greater clarity around roles and responsibilities of the different players in the system. However, there is also a need to consider how well the full suite of legislation, regulations, rules and standards deliver against the objectives of the biosecurity system, in particular how best the broad range of levers that the various legislative and supporting instruments provide can be used more effectively to deliver the outcomes desired (e.g. Biosecurity Act, Resource Management Act, Fisheries Act, Hazard Substances and New Organisms Act, Local Government Act, Exclusive Economic Zone (Environmental Effects) Act etc.).

At a more specific level, there is strong agreement across the sector that

- There is a need for a national approach to managing marine biosecurity, to enable a more coherent, proactive approach to managing biosecurity risk in the marine environment. This can be used to provide greater direction on science, technology and capability development and infrastructure needs, including how to provide for management of risks beyond New Zealand's territorial limits.
- The Import Health Standard framework (IHS) is no longer sufficient to reflect the increasingly globalised world in which New Zealand trades. In particular, as currently operated, there is concern the IHS framework is not sufficient to manage risk, or agile enough to respond to changes and a changing environment.

Networks

Connecting assets and skills nationally and internationally (i.e. networks) is a fundamental element of a successful, resilient biosecurity system. A new, additional outcome for this Strategic Direction has been established to ensure the appropriate level of focus and investment (time, people and financial) is provided for in the Bio 2025 implementation plan. This will involve, but not be limited to:

- Establishing and enhancing the opportunities for 'networks of networks'
- Improved understanding of available resources (technology and experts) nationally and internationally
- Recognising and supporting the role Māori have, working with other indigenous cultures around biodiversity and biosecurity, to enable this relationship to be better utilised in the national NZ biosecurity system (both offshore and within New Zealand).
- Enabling local-level community and Maori activity to be connected nationally, to improve knowledge, experience and resource sharing
- Addressing gaps in international information-sharing networks (e.g. about emerging risks and new trade pathways)

Enhance the Biosecurity System through the active contribution of iwi and hapū

Iwi and hapū have a fundamental role in New Zealand's biosecurity system. At present there is a lack of recognition of Māori infrastructure, expertise and needs. This work plan recognises the need to specifically consider and provide for partnering with Maori to deliver NZ's biosecurity outcomes. This will be achieved through targeted capability and capacity building at whanau, hapū and iwi levels to actively contribute to, and participate in, biosecurity action – be it planning, knowledge, management, or response.

Human health as part of the biosecurity system

The potential impacts on and benefits to health of biosecurity activities are recognised and acknowledged throughout all levels of the work plan. It is important that the impacts on and benefits to health are included as primary considerations in biosecurity decisions, and are obvious and transparent. This includes ensuring there is health input into biosecurity activities and responses.

4. Summary of the Plan

| GOAL | OUTCOME | KEY ACTIONS |
|--|--|--|
| <p style="text-align: center;">Skills</p> | <p>The biosecurity workforce is made up of enough people, with the right knowledge and skills, to meet our current and future biosecurity challenges</p> <p>Careers available in biosecurity-related fields are well understood and sought after.</p> <p>Biosecurity is incorporated into primary, secondary and tertiary education.</p> <p>Biosecurity skills and capability are enhanced across the system, through training packages and modules, professional development initiatives, internships and work experience, and educational resources.</p> <p>Biosecurity skills and capability within the system are recognised, valued, shared and retained.</p> <p>Robust, resilient and enduring infrastructure supports biosecurity system functions</p> <p>Biological collections and databases, supported by world-class taxonomic expertise and research, provide the evidence base for New Zealand to respond effectively to present and future challenges.</p> | <p>Understanding biosecurity system assets and capability needs through baseline assessments, stock-takes and gap analysis across the system.</p> <p>Developing and implementing a Biosecurity Capability Development Plan which will:</p> <ul style="list-style-type: none"> • Ensure accurate and up-to-date information on biosecurity careers is available through national and international career information platforms • Implement a programme to support biosecurity awareness in early learning, primary and secondary school education, and professional development • Improve alignment of tertiary education provision with system needs, through tertiary institutions and the sector working more closely together to identify and deliver on system training and education needs • Develop vocational training and educational pathways, to facilitate entry into working in the biosecurity system • Establish nationally approved standards and qualifications in biosecurity, registered on the National Qualifications Framework • Establish specific professional recognition processes and certificates • Build corporate governance and senior leadership capability for biosecurity • Build biosecurity capability internationally through internships, training, exchange programmes and scholarships with countries that pose elevated biosecurity risk to New Zealand • Establish a programme to broaden reach of biosecurity training to other sectors • Establish a business certification system for those businesses operating in biosecurity system (e.g. transporters, diggers, construction, irrigators). • Recognise and celebrate the success of individuals, organisations and programmes • Enable and promote opportunities for personal and professional development (and provide clear career paths), including secondments, short courses, exposure to new ideas and experiences (travel, field trips) • Celebrate and promote the field of biosecurity through organising and attending conferences (e.g. through presentations, posters, etc) <p>Developing and implementing a Biosecurity system asset development plan through:</p> |
| | <p style="text-align: center;">ASSETS</p> | <p>Critical system infrastructure is well resourced, maintained and accessible to support risk management; this infrastructure includes laboratories and information technology systems.</p> <p>Critical policy infrastructure, such as legislation and standards, are fit for purpose, and support agile biosecurity risk management.</p> <p>Critical processes and systems are in place that ensure NZ is well networked nationally and internationally for a more effective and efficient biosecurity system.</p> |

5 Future state – how we will know if we have made a difference

GOAL: Skills

The biosecurity workforce is made up of enough people, with the right knowledge and skills, to meet our current and future biosecurity challenges

OUTCOME

Biosecurity-related careers¹

Careers available in biosecurity related fields are well understood and sought after.

What success would look like

- People know they have career opportunities and options in biosecurity
- Career opportunities in biosecurity are clearly and accurately described and represented to a wider audience – at school, tertiary education, hapū and whanau, and community level
- Breadth of skillsets and expertise required in the biosecurity system are known, documented and updated
- The needs of the biosecurity system are accurately reflected in terms of skills, and people employed in the system
- Increased interest in biosecurity-related careers

Biosecurity in education

Biosecurity is incorporated² into primary, secondary and tertiary education.

- Educators are confident in incorporating biosecurity elements, including human health impacts and benefits, into their curriculum and teaching
- Biosecurity is used as a context for learning in both Māori and English, in early childhood, primary, secondary and tertiary learning programmes (including Kōhanga Reo, Kura Kaupapa and wānanga)
- Consistent core set of skills and understandings incorporated in tertiary programmes of learning and assessment (including industry training and related standards)
- Human health is considered in the development of biosecurity science capabilities
- New Zealanders naturally engage in biosecurity action (e.g. kids washing boots in sink vs on the grass >> kauri dieback), because they understand and value why they are taking this action
- Young people encouraging and prompting positive biosecurity action in their whanau and community
- Biosecurity education also happens outside the classroom, for example
 - EOTC (education outside the classroom) within the curricula
 - Extracurricular education opportunities (e.g. OSCAR, marae, NGOs, holidays, personal development, scouts and guides)

¹ Careers are defined as paid workforce (but can be in a broad suite of areas, e.g. community groups and NGOs, as well as more traditional careers, e.g. laboratory, field managers, border control)

² The working group considers 'incorporated' to mean embedded, as well as specified, and the outcome covers extra-curricular education

GOAL: Skills

The biosecurity workforce is made up of enough people, with the right knowledge and skills, to meet our current and future biosecurity challenges

Training and building capability

Biosecurity skills and capability are enhanced across the system through training packages and modules, professional development initiatives, internships and work experience, and educational resources.

- Consistent core biosecurity skills and understandings are part of staff professional development for all key agencies and organisations. Training includes specific attention to:
 - Working effectively with Māori as treaty partners
 - Increasing understanding of how to work with Māori
 - Increasing collaboration and partnership across and between agencies and organisations
- Training capability support for volunteers, iwi and hapū in the biosecurity system
- Training capability support for people working in biosecurity-related sectors (e.g. farmers, kaitiaki, importers, pack houses)
- Increased awareness and informed connections between all components of the system (link to SD1), including recognition of the impacts and benefits of the system on human health
- System-wide information about core skills and capabilities at a range of levels is collected, to enable a view of what skills the system needs (now and in the future)
- Ongoing capability and capacity-building nationally and internationally
- NZ recognised a provider of biosecurity career-related training internationally

Retaining capability

Biosecurity skills and capability within the system are recognised, valued, shared and retained.

- Core set of skills and understandings incorporated in on-the-job training (e.g. nationally through provision of ITO learning and assessment tools)
- Ongoing professional development opportunities for current workforce exist to support lifelong learning (nationally and internationally)
- Career progression opportunities and pathways exist and are clearly understood
- Society values all roles in the biosecurity system (professional and volunteer) so that we retain skills and talent
- Organisational leadership in the biosecurity system values and recognises biosecurity skills and understanding, e.g. through participation in conferences, celebrating success, awards (internally within organisations but also through the national awards – SD1)
- Capability gaps in the biosecurity system are filled
- Volunteers are valued and barriers for participation are removed

GOAL – Assets

Robust, resilient and enduring infrastructure supports biosecurity system functions

OUTCOME

Biological Collections

Biological collections and databases, supported by world-class taxonomic expertise and research, provide the evidence base for New Zealand to respond effectively to present and future challenges.

What success would look like

- World class diagnostic skills important for biological collections and databases are available
- Collections and databases are maintained, accessible, interconnected and comprehensive
- The best possible information informs the system
- Collections and databases keep evolving based on research, so that they are fit for purpose to anticipate emerging risks in a timely manner
- Benefits to the biosecurity system flow from having well-defined relationships between iwi and hapū, and holders of biological collections

Physical infrastructure and systems

Critical system infrastructure is well resourced, maintained and accessible to support risk management; this infrastructure includes laboratories and information technology systems.

- Critical infrastructure is identified – now and for the future
- NZ has sufficient PEQ infrastructure to meet demand for new germplasm
- NZ has a well-maintained suite of laboratories and technological equipment, and the right people to run them to meet biosecurity needs
- Barriers (financial, social, economic, political, regulatory) to establishing and making use of new biosecurity infrastructure are reduced
- Maori ecosystem knowledge systems support biosecurity risk management
- Māori have infrastructure to manage and mitigate biosecurity risk in their rohe
- Māori are working with stakeholders and partners to effectively manage biosecurity risk at a regional level

Legal and regulatory infrastructure

Critical policy infrastructure, such as legislation and standards, are fit for purpose, and support agile biosecurity risk management

- A holistic view is applied across disciplines to manage risk, with attention to environmental, health, economic, cultural and social outcomes
- Legislative tools are adaptive and responsive to changing risk environment
 - Roles and responsibilities are clearly stated and understood
 - Regulatory tools are scalable from community to national level
 - Decisions around biosecurity are made on the basis of science and risk
- There is coherence of legislation and regulatory frameworks across the biosecurity system.
 - Consistent biosecurity decisions are made across the system (e.g. pest management across regional councils)
 - Regulatory tools are accessible and understood
 - Effective legislative tools are available to manage biosecurity risk

GOAL – Assets

Robust, resilient and enduring infrastructure supports biosecurity system functions

OUTCOME

Connecting assets and skills nationally and internationally

Critical processes and systems are in place that ensure NZ is well networked nationally and internationally for a more effective and efficient biosecurity system

What success would look like

- NZ is able to co-ordinate and mobilise capability across sectors and stakeholders, to enable an effective and cohesive biosecurity system
- National and international networks are maintained, resourced, and used
- A 'network of networks' exists – engagement and communication between different networks enables sharing of expertise, knowledge and experience (e.g. between local community groups, scientific communities and biosecurity managers)
- Māori are working closely with other indigenous cultures around biodiversity and biosecurity, enabling them to influence and provide expertise to the biosecurity system
- Critical processes, systems and agreements are appropriately linked – we're sufficiently connected to influence outcomes
- Easy access to linked assets allows better use of information (including historical) to inform decision making
- Barriers and constraints to the application of knowledge and use of assets in the service of the biosecurity system are identified and addressed.
- Volunteer networks are actively considered in biosecurity activities, and barriers for participation are removed

6 How we are going to get there

The following programmes and actions have been identified to achieve goals and outcomes set out in the Bio2025 Strategic Direction document. They have been identified by the working group as a minimum of what is needed to move from the current state of the biosecurity system's skills and assets (as described in section 3) to the desired future state (section 5).

Implementing the Skills and Assets Work Plan

Clear ownership, responsibility and accountability for the implementation of the Skills and Assets Work Plan is essential if the identified outcomes are to be achieved.

- 1 Establish a group or mechanism to oversee the implementation of, regularly review and update the Skills and Assets Action Plan. This will require:
 - Clear roles and responsibilities
 - Tracking progress against agreed actions
 - Understanding existing needs and monitoring changing capability and capacity needs
 - Assessing whether resourcing of capacity and development of capability is fit for purpose
 - Ongoing monitoring to ensure barriers and constraints to successful operation of the system are identified and addressed in a timely way

Understanding biosecurity system assets and capability needs

It is important to understand what the biosecurity system needs in terms of assets – infrastructure, systems, and networks – to ensure the capacity and capability are available to deliver for the system.

2 Capability needs

- 2.1 Undertake baseline assessments, stock-takes and gap analysis across the system
 - 2.1.1 Skills and expertise – what we have, what we need, what we will require in the future – including skills framework for information age (map against the capacity needs assessment)
 - 2.1.2 The opportunities provided by the NZ Curriculum, Te Marautanga o Aotearoa and NCEA, training and education providers, existing certificate, diploma, undergraduate and graduate courses which support biosecurity system
 - 2.1.3 Identify key competencies needed to be a biosecurity practitioner, including cultural competencies
 - 2.1.4 Document and map existing training (e.g. MPI staff) that has supported careers and employment in biosecurity (e.g. policy, science, compliance, data analysis, communications)
 - 2.1.5 Identify international capability and needs as they relate to the NZ biosecurity system – what is happening or in place, key shortages looming, and options on how to address
 - 2.1.6 Identify key audiences, e.g. school leavers, undergraduates, Māori (young and kaitiaki?), non-traditional disciplines
 - 2.1.7 Undertake assessment of demographics of current workforce (diversity)
 - 2.1.8 Identify tools and resources (e.g. teaching materials, workshops, etc.) to support capability development
 - 2.1.9 Map existing national competency standards and qualifications, and design or expand to deliver career pathways and biosecurity requirements in all relevant related fields
- 2.2 Undertake assessment of why people are drawn to or leaving biosecurity

3 Asset requirements

- 3.1 Biosecurity infrastructure and systems

- 3.1.1 Identify critical infrastructure and system requirements to support the New Zealand biosecurity system
- 3.1.2 Undertake comprehensive stock-take of existing infrastructure and systems
- 3.1.3 Identify gaps within and risks to existing infrastructure and systems, and identify any need for new infrastructure and systems
- 3.1.4 Identify existing funding arrangements
- 3.1.5 Identify the regulatory instruments that govern and/or impact on the biosecurity system
- 3.2 Biological databases and collections
 - 3.2.1 Comprehensive stock-take of existing biological collections and databases and staff, to identify biosecurity-relevant information gaps regarding their capacity to deliver fit for purpose expert information
 - 3.2.2 Identify the uses of the databases and collections, the users, purposes, and how collections and databases are accessed
 - 3.2.3 Identify barriers and constraints to maintenance and development of databases and collections, and the capacity to deliver data and fit for purpose information for biosecurity purposes
- 3.3 Networks
 - 3.3.1 Undertake stock take and gap analysis of what networks exist, what they do, and what value they provide, or can provide, to the biosecurity system
 - 3.3.2 Identify barriers to networks contributing to New Zealand’s biosecurity risk management
 - 3.3.3 Identify key audiences and their needs

Biosecurity Capability Development Plan

Ensuring New Zealand’s biosecurity system has the skills and capability it needs

4 Biosecurity-related careers

- 4.1 Establish a programme to make accurate and up to date information on biosecurity careers available through national and international career-information platforms
 - 4.1.1 Develop and maintain skills register that provides information on the current and future skill and expertise requirements of the biosecurity system, and is easily accessible to industry, education and training providers, students, employees and biosecurity professionals
 - 4.1.2 Establish programme to target the filling of current and emerging critical skill and expertise gaps
 - 4.1.3 Update Careers NZ website and link to the Vocational Pathways programme
 - 4.1.4 Train, educate and utilise career counsellors and other places where people go for career information or advice
 - 4.1.5 Highlight the importance of biosecurity, for example through information on and examples of the true cost of failure and the real value of success (e.g. impact of PSA on different parts of the horticulture industry), and tie to role of every worker involved (i.e. make a difference)
 - 4.1.6 Promote the diversity of biosecurity careers, e.g. identify and develop good stories or examples of careers in biosecurity
 - 4.1.7 Highlight exciting career opportunities, how to get there, potential earnings (not just tertiary education dependent). For example, have an international component (e.g. positioning abroad being competitive on the international jobs market, people in biosecurity get exposure to ‘the world’s best’, etc.)
 - 4.1.8 Target key audiences – school leavers, undergraduates, Māori (rangatahi and kaitiaki), non-traditional disciplines – using audience appropriate media

5 Biosecurity in education

- 5.1 Develop and implement a programme to support incorporation of biosecurity awareness in early learning, primary and secondary school education, and professional development
 - 5.1.1 Widen accessibility to and awareness of existing resources – i.e. teacher resources, datasets etc.
 - 5.1.2 Develop and promote use of biosecurity resources (e.g. MPI teacher resources, experiential learning, Curious Minds, Te Reo and Tikanga resources, LOTC) to incorporate into curriculum and teaching
 - 5.1.3 Develop and use existing pre- and in-service programmes and mechanisms, to support teachers to use biosecurity contexts (e.g. teacher conferences, Science Learning Hub)
 - 5.1.4 Celebrate the use of effective examples of biosecurity as context for learning (e.g. Predator Free NZ)
- 5.2 Improve alignment of tertiary education provision with system needs by
 - 5.2.1 Establishing a mechanism for tertiary institutions and the sector to work more closely together to identify training and education needs in support of the biosecurity system, with specific reference to identifying and providing for:
 - The need for certificate, diploma, undergraduate and graduate courses
 - Capability and capacity needs of tertiary education providers to provide the courses
 - Opportunities for incorporating workplace learning
 - 5.2.2 Identifying and developing biosecurity-related case studies that can be used in other courses (e.g. statistics, economics)
- 5.3 Develop vocational training and educational pathways to facilitate entry into careers in the biosecurity system
 - 5.3.1 Utilise current review of vocational qualifications and standards in primary sector (NZQA) to develop assessment standards and portfolios that meet needs of wider biosecurity system
 - 5.3.2 Establish 'micro-credentialing' to recognise skills and drive towards more tertiary involvement
 - 5.3.3 Establish experiential bridging pathway to qualifications
 - 5.3.4 Develop a framework to support experiential learning across and within the system (e.g. apprenticeships, scholarships, internships, secondments, fellowships)

6 Training and building capability

- 6.1 Establish specific professional recognition processes and certificates including:
 - 6.1.1 Developing material on key competencies needed to be a biosecurity practitioner, including understanding of the regulatory framework and cultural competencies
 - 6.1.2 Establishing a professional recognition system based on demonstration of expertise, qualification and/or experience (for example through a professional institution)
 - 6.1.3 Identify and establish qualifications, skills and expertise that are required at each level of decision-making (operational, strategic and governance)
- 6.2 Build corporate governance and strategic leadership capability in biosecurity
 - 6.2.1 Inclusion of biosecurity course or certificate in Institute of Directors training programme(s)
 - 6.2.2 Develop in-house training materials for directors and senior leadership teams in:
 - Biosecurity governance
 - Risk assessment of biosecurity threats
 - Assessing biosecurity investments
 - Providing and maintaining stakeholder engagement in biosecurity preparedness
 - Managing public communications

- Partnering with other institutions and organisations
 - 6.2.3 Deliver industry leader-led biosecurity governance seminars for boards and leadership teams
 - 6.2.4 Engage Directors in response simulations to improve awareness and understanding of issues and governance dimensions
 - 6.3 Build biosecurity capability internationally to improve management of biosecurity risk offshore
 - 6.3.1 Provide training, exchange programmes and scholarships with countries that pose elevated biosecurity risk to New Zealand, and have a capability gap to manage that risk
 - 6.3.2 Set up an internship programme in New Zealand (industry, government, science, communities) for overseas biosecurity practitioners
 - 6.4 Establish programme to broaden reach of biosecurity training
 - 6.4.1 Target industries that intersect with the biosecurity system, but do not traditionally receive information and/or training that would enhance their contribution to the system (e.g. importers, vehicle assemblers, hospitality and tourism sectors)
 - 6.4.2 Get biosecurity modules embedded into wider vocational, industry and tertiary training programmes
 - 6.4.3 Develop biosecurity cultural competency certification (online) – (see MOH cultural competency for public health)
 - 6.4.4 Develop ‘off the shelf’ programmes and resources to support raising organisational understanding
 - 6.4.5 Provide information on available approved training (i.e. under NZQF, Biosecurity Act, etc.) and who offers it
 - 6.4.6 Develop and provide guidance on how to use the Biosecurity Act on the ground
 - 6.5 Establish a business certification system for businesses operating in the biosecurity system (e.g. transporters, diggers, construction, irrigators)
- 7 Retaining capability and ensuring succession**
- 7.1 Recognising and celebrating the success and expertise of individuals, organisations and programmes in order to:
 - 7.1.1 Recognise the skills, showcase the work, set visibility, raise the profile
 - 7.1.2 Recognise the monetary and non-monetary value that staff and organisations contribute to biosecurity
 - 7.1.3 Encourage businesses to establish reward programmes that promote the value of biosecurity knowledge and practice
 - 7.2 Enable and promote opportunities for personal and professional development (and provide clear career paths) including secondments, short courses, exposure to new ideas and experiences (travel, field trips)
 - 7.3 Celebrate and promote the field of biosecurity through organising and/or attending conferences (e.g. through presentations, posters, etc)
 - 7.4 Promote the need for good succession planning and handover for key positions within the system (link to SD4)

Biosecurity system asset development plan

Ensuring New Zealand's biosecurity system assets are fit for purpose (resilient, agile, adaptive, responsive, and future proof)

8 Ensure NZ's physical infrastructure and systems are fit for purpose

8.1 Implement programme to improve and enhance use and functionality of existing infrastructure and systems

8.1.1 Ensure the New Zealand Organism Register is resourced and maintained on an ongoing basis. This includes:

- Developing tools to enable further implementation of Preferred Organisms' Names and provide improved access to users
- Supporting data sources that feed into the NZOR
- Ensuring use of NZOR information by other systems

8.1.2 Building on the findings of the NZRS report on national taxonomic collections of NZ, enhance and develop existing biological collections to support biosecurity needs, and provide for coordination, protection and stewardship

- Join up databases and collections into an interoperable system
- Ensure appropriate funding and prioritisation of support for taxonomic collections (including MBIE review of funding of nationally significant collections)
- Utilise existing educational collections, adding where necessary to give biosecurity flavour, i.e. to support training and education for a variety of levels and purposes (link to system capability plan)
- Develop and implement programme to:
 - Address biosecurity-relevant information gaps in existing databases and biological collections, including development of new collections and related research as identified through stock-take and gap analyses
 - Enable users to access the information they need easily
 - Ensure the maintenance and development of databases and collections address biosecurity needs, including curation and expertise
 - Develop existing educational and training collections, adding where necessary to give biosecurity flavour to support training and education for a variety of levels and purposes

8.1.3 The interception database of exotic organisms, including medical vectors and pathogens, is developed and is well maintained

8.1.4 Improve access to treatment and treatment facilities (e.g. radiation)

8.1.5 Implement processes for managing risk offshore, such as

- accreditation of offshore facilities
- managing bio-fouling pathways

8.1.6 Ensure effective processes are in place for managing the biosecurity risk NZ poses to other countries

8.1.7 Enhance capacity for remote diagnostics

8.1.8 Establish protocols and plans for infrastructure sharing (e.g. equipment at universities)

8.2 Develop and implement programme to support existing and deliver new critical infrastructure and systems

8.2.1 Implement the findings of the gap analysis

- 8.2.2 Identify and secure sustainable funding for existing and new critical infrastructure
- 8.2.3 Establish Post Entry Quarantine (PEQ) facilities as required
- 8.2.4 Develop mobile tools for frontline staff, e.g. inspectors, fieldworkers, so that they can identify species more quickly and easily

9 The biosecurity policy and regulatory framework facilitates the needs of the biosecurity system

- 9.1 Review the regulatory and policy framework to identify improvements to ensure biosecurity system objectives are being met (taking into account actions and outputs arising from SD1, SD2, SD3 and SD 4)
- 9.2 Stakeholders and MPI work together to ensure the enabling legislation (BSA, RMA, HSNO, etc.) and supporting tools – regulations, standards, protocols, policies, etc. – are fit for purpose
 - 9.2.1 Implement the outcome of the review of the regulatory and policy framework
 - 9.2.2 Facilitate the use of existing tools (BtK spray, 1080) and future tools (e.g., gene editing)
- 9.3 Develop a RMA national policy statement on biosecurity to provide direction to local authorities and communities on how to better provide for biosecurity (protection of the environment) in plans – and support more sustainable resourcing
- 9.4 Identify and overcome impediments to implement Pathway Management Plans to be more cost effective, timely and responsive
- 9.5 Develop a coherent national approach for managing marine biosecurity domestic pathways
- 9.6 Identify tools, processes and guidance on how to mainstream biosecurity into local government policies, plans and actions
- 9.7 Review import health standards system to see if this is fit for purpose

10 Connecting assets and skills nationally and internationally

- 10.1 Enable information, capability, system and infrastructure networks to contribute to delivering efficient and effective biosecurity outcomes through:
 - 10.1.1 Addressing barriers to professional and community networks contributing to New Zealand’s biosecurity risk management
 - 10.1.2 Establishing and maintaining an online-based portal for networks to engage with the biosecurity system
 - 10.1.3 Communicating and demonstrating to users the benefits from participating in networks, for example by:
 - Using case studies of networks, and networks of networks, that work really well: best practice examples, showcase success, showing their area of influence
 - Supporting and enabling the sharing of resources and equipment
 - 10.1.4 Supporting trans-Tasman initiatives where appropriate (for example the DNA referencing library for exotic species)
 - 10.1.5 Presenting information in an easily accessible way that will meet the needs of individuals and networks
 - 10.1.6 Expand the National Biosecurity Capability Network, or its successor, to provide access to skilled individuals who can be called on to rapidly mobilise and manage biosecurity incursions
 - 10.1.7 Facilitate transfer of skills and knowledge between organisations (government, iwi and hapū, private sector, research, community)
 - 10.1.8 Review and update the Memorandum of Understanding between MAF, DOC and MoH (dated 2006).

Partnering with Maori in biosecurity

- 11 Enhance the Biosecurity System through the active contribution of iwi and hapū traditional ecological knowledge systems**
 - 11.1 Enable Māori to have their own regional native pātaka such as seedbanks, for example to mitigate the risk of loss of taonga species
 - 11.2 Identify and address barriers to Māori, iwi and hapū participation in local, regional, national and international biosecurity management and information networks
 - 11.3 Build capability of Māori, iwi and hapū through
 - 11.3.1 Iwi and hapū working with tertiary institutions to identify and develop programmes that meet their training and education needs across the biosecurity system
 - 11.3.2 Experiential bridging pathways for young Māori to tertiary institutions and into biosecurity related careers, such as apprenticeships and use of ‘micro-credentialing’ to recognise skills
 - 11.3.3 Establishing summer scholarships for rangatahi to work in the biosecurity system (e.g. biological collections)
 - 11.3.4 Developing and implementing Māori biosecurity Kaitiaki national accreditation programme
 - 11.4 Developing closer relationships with national biological collections
 - 11.4.1 Te Tira Whakamātaki engage with the National Systematics and Taxonomic Collections Working Group to assess the current state of agreements between collection holders and Māori, how these operate, and issues for the future, in respect to biosecurity
 - 11.4.2 Development of a protocol framework and supporting guidance to support iwi and hapū engagement and involvement with national and international collections, for the benefit of the biosecurity system
 - 11.5 Expose non-Māori to the concept of kaitiakitanga (Māori biosecurity practices). This would involve for example a review of the literature and collection of narratives
 - 11.6 Embedding engagement with Maori within ‘official’ biosecurity framework starting with incident management (biosecurity response model)

7 Sequencing of key actions



= Activity initiated










= Baselined activity



= Contributing activity under way by third parties

| Tomorrow's skills and assets | Near term 2018-2019 | Med term 2020-2022 | Long term 2023-2025 |
|--|------------------------|-----------------------|------------------------|
| Implementing the Skills and Assets Action Plan | | | |
| 1. Establish a group or mechanism to oversee the implementation, regularly review and update the Skills and Assets Action Plan | | | |
| Stocktake and Gap analysis | | | |
| 2. Stock-take and gap analysis of NZ biosecurity infrastructure and systems, biological collections and data bases, and networks | | | |
| 3. Stock-take and gap analysis of NZ biosecurity capability needs, including assessment of why people are leaving biosecurity | | | |
| Capability development plan | | | |
| 4. Biosecurity-related careers | | | |
| 4.1 Establish programme to make accurate and up-to-date information on biosecurity careers available through national and international career information platforms | | | |
| 5. Biosecurity in education | | | |
| 5.1 Develop and implement a programme to support biosecurity awareness in early learning, primary and secondary school education, and professional development | | | |
| 5.2 Improve alignment of tertiary education provision with system needs | | | |
| 5.3 Develop vocational training and educational pathways to support alternative or non-traditional means of entry into working in the biosecurity system | | | |
| 6. Training and building capability | | | |
| 6.1 Establish specific professional recognition processes and certificates | | | |
| 6.2 Build corporate governance and strategic leadership capability in biosecurity | | | |

| Tomorrow's skills and assets | Near term 2018-2019 | Med term 2020-2022 | Long term 2023-2025 |
|---|---|---|---|
| 6.3 Build biosecurity capability internationally |  |  |  |
| 6.4 Establish programme to broaden reach of biosecurity training | |  | |
| 6.5 Establish a business certification system for those businesses operating in biosecurity system (e.g. transporters, diggers, construction, irrigators) | |  | |
| 7 Retaining capability | | | |
| 7.1 Establish programme to support employers to retain capability and ensure succession |  |  | |







Capacity development plan

8 Implement programme to improve/enhance use and functionality of existing infrastructure and systems

8.1 Ensure NZ's physical infrastructure and systems are fit for purpose

| | | | |
|---|---|---|---|
| 8.1.1 Update the New Zealand Organism Register and ensure it is resourced and maintained |  |  |  |
| 8.1.2 Enhance and develop existing biological collections to support biosecurity needs | |  |  |
| 8.1.3 Improve access to treatment and treatment facilities | |  |  |
| 8.1.4 Implement processes for managing risk offshore |  |  |  |
| 8.1.5 Ensure effective processes are in place for managing the biosecurity risk NZ poses to other countries | | | |
| 8.1.6 Enhance capacity for remote diagnostics |  |  | |
| 8.1.7 Establish protocols and plans for infrastructure sharing |  | | |

8.2 Develop and implement programme to support existing and deliver new critical infrastructure and systems

| | | | |
|--|---|---|---|
| 8.2.1 Implement the findings of the gap analysis |  |  |  |
| 8.2.2 Identify and secure sustainable funding for existing and new critical infrastructure |  |  |  |

8.2.3 Provide Post Entry Quarantine (PEQ) facilities



8.2.4 Development of mobile tools for frontline staff, e.g. inspectors, so that they can identify species more quickly and easily



9 The biosecurity policy and regulatory framework facilitates the needs of the biosecurity system

9.1 Review the regulatory and policy framework to identify improvements to ensure biosecurity system objectives are being met



9.2 Stakeholders and MPI work together to ensure the enabling legislation and supporting tools facilitate the use of existing tools



9.3 Develop a national policy statement on biosecurity



9.4 Identify and overcome impediments to implementing Pathway Management Plans to be more cost effective, timely and responsive



9.5 Develop a coherent national approach for managing marine biosecurity domestic pathways



9.6 Identify tools, processes and guidance on how to mainstream biosecurity into local government policies, plans and actions



9.7 Review of import health standards system to see if it is fit for purpose



10 Connecting assets and skills nationally and internationally

10.1 Enable information, capability, system and infrastructure networks to contribute effectively to delivering efficient and effective biosecurity outcomes through:

10.1.1 Addressing barriers to professional and community networks contributing to New Zealand's biosecurity risk management



10.1.2 Establishing and maintaining an online-based portal for networks to engage with the biosecurity system



10.1.3 Communicating and demonstrating to users the benefits from participating in networks



10.1.4 Presenting information in a way that individuals and networks can easily access the information they need



























10.1.5 Expanding the National Biosecurity Capability Network



Partnering with Maori in Biosecurity

11 Enhance the biosecurity system through the active contribution of iwi and hapū traditional ecological knowledge systems

| | | | | |
|--------|--|---|---|---|
| 11.1 | Enabling Māori to have their own regional native pātaka |  |  |  |
| 11.2 | Address barriers to Māori, iwi and hapū participation |  | | |
| 11.3 | Build capability of Māori, iwi and hapū through | | | |
| 11.3.1 | Iwi and hapū working with tertiary institutions to identify and develop programmes to meet their training and education needs across the biosecurity system |  |  |  |
| 11.3.2 | experiential bridging pathways for young Māori to tertiary institutions and into biosecurity related careers |  |  |  |
| 11.3.3 | establishing summer scholarships for rangatahi to work in the biosecurity system |  |  |  |
| 11.3.4 | Developing and implementing [Māori] biosecurity Kaitiaki national accreditation |  |  |  |
| 11.4 | Developing closer relationships with national biological collections | | | |
| 11.4.1 | Te Tira Whakamātaki engage with the National Systematics and Taxonomic Collections Working Group to assess the current state of agreements between collection holders and Māori, how these operate, and issues for the future, in respect to biosecurity |  | | |
| 11.4.2 | Development of a protocol framework and supporting guidance to support iwi and hapū engagement and involvement with national and international collections for the benefit of the biosecurity system |  | | |
| 11.5 | Expose non-Māori to the concept of kaitiakitanga (Māori biosecurity practices). This would involve for example a review of the literature and collection of narratives |  |  |  |
| 11.6 | Embedding engagement with Maori within 'official' biosecurity framework starting with incident management (biosecurity response model) |  |  |  |

5 Targets

Targets

- At least 150,000 people with identified skills can be drawn on to quickly support during biosecurity incursions. This will be delivered by the National Biosecurity Capability Network or its successor.

Appendix 1 Preliminary Biosecurity System Capacity Map

| Biological collections | Physical infrastructure and systems | Capability and capacity (possible new) | Legal and regulatory infrastructure |
|---|--|---|--|
| Taxonomic collections NIWA Scion Cawthron GNS Science Landcare Research University of Canterbury Lincoln University Massey University University of Auckland University of Otago Canterbury Museum Te Papa Auckland Museum Otago Museum Unitec ESR South Canterbury Museum University of Waikato Waitomo Caves Whanganui Museum Living collections Wellington BG Otari-Wilton Auckland BG Christchurch Dunedin Studbooks <ul style="list-style-type: none"> - Mount Bruce - Rainbow Springs - Auckland Zoo - Wellington Zoo - Hamilton Zoo - Queenstown - ??? | Management and Response MPI <ul style="list-style-type: none"> - Laboratories - Incinerators - Containment/quarantine facilities CRIs and other research institutions AsureQuality Ports? Border sector collaboration – MPI, Customs, Immigration, MOT (MNZ?) Research and innovation facilities <ul style="list-style-type: none"> - NWA - SCION - Agresearch - ESR - Landcare - GNS - Plant and Food - Callaghan - Cawthron (and other private) - Universities/polytechnics - Massey epicentre - Museums (national [Te Papa] and regional) Education <ul style="list-style-type: none"> - Schools - Polytechs - Universities - Wananga - ITO - Some CRIs Service sector <ul style="list-style-type: none"> - ACP - Pest control - Fumigation - Ag (forestry) Suppliers - Manufacturers - Processors Surveillance systems <ul style="list-style-type: none"> - MPI border | Networks Biosecurity capability network Māori Biosecurity Network CEEF and Biosecurity Managers Network NGO networks (eg ECO) Forest and Bird Government MPI DOC EPA MNZ LINZ MfE MoH NZQA TEC Regional Councils Territorial authorities Non-government Organisations Professional societies/associations eNGOs Community organisations Iwi and hapū <ul style="list-style-type: none"> • Kaitiaki • Kaumatua • Marae Industry bodies and associations GIA CRIs B3 Citizen Science initiatives <ul style="list-style-type: none"> - Naturewatch | “Primary” Legislation Biosecurity Act <ul style="list-style-type: none"> - Import standards - Pest management plans - Pest management pathways - Ministerial/DG powers Resource Management Act <ul style="list-style-type: none"> - National Policy statements (biodiversity, marine, anything else) - National Environmental standards - Regional policy statements Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act Environment Reporting Act Hazardous Substances and New Organisms Act Agricultural Compounds and Veterinary Medicines Act 1997 Animal Control Products Limited Act 1991 National Animal Identification and Tracing Act 2012 Marine Mammals Protection Act 1978 Marine Reserves Act 1971 National Parks Act 1980 Native Plants Protection Act 1934 Reserves Act 1977 Trade in Endangered Species Act 1989 Wild Animal Control Act 1977 Wildlife Act 1953 Fisheries Act 1996 Related legislation <i>Governance</i> Conservation Act 1987 Local Government Act Environment Act 1986 Environmental Protection Authority Act Forests Act 1949 Marine and Coastal Area (Takutai Moana) Act |

| Biological collections | Physical infrastructure and systems | Capability and capacity (possible new) | Legal and regulatory infrastructure |
|---|--|--|---|
| <p>Traditional knowledge systems</p> | <ul style="list-style-type: none"> - MPI traps - CRI international surveillance - Port authorities <p>Information systems</p> <p>FOL</p> <p>Agribase</p> <p>NAIT</p> <p>TB Disease Management System</p> <p>TK systems</p> <p>Bionet</p> <p>NABIS</p> <p>Aquaculture database</p> <p>NZOR</p> <p>NZVH</p> <p>Biodiversity</p> <p>National parks</p> <p>Marine reserves/MPAs</p> <p>Mataitai</p> <p>Rahui – process but can result in medium term protection of an area</p> <p>Sanctuaries</p> <ul style="list-style-type: none"> - Offshore islands - Zealandia - Orokānui - Maungatautari <p>Landscape initiatives</p> <ul style="list-style-type: none"> - Cape to City - Taranaki Mounga | <p>International connections and networks</p> <p>Primary sector enterprises (eg farms, orchards, pack houses, plantations, nurseries, ports etc)</p> <p>Leadership (cross sector)</p> <p>Pest Management</p> <p>Regional Councils</p> <p>OSPRI</p> <p>DoC</p> <p>Private sector</p> <p>ZIP</p> <p>Community organisations</p> | <p>Māori Fisheries Act 2004</p> <p>Queen Elizabeth II National Trust Act 1977</p> <p><i>Research</i></p> <p>Crown Research Institutes Act</p> <p>Research Science and Technology Act</p> <p>Museum of New Zealand Te Papa Tongarewa Act</p> <p>Also acts protecting collections at Auckland, Canterbury and Otago Museums</p> <p><i>Education</i></p> <p>Education Act</p> <p>Industry Training Act</p> <p>Industry Training and Apprenticeships Act</p> <p>Taratahi Agricultural Training Centre (Wairarapa) Act 1969</p> <p>Veterinarians Act 2005</p> <p><i>Other possible</i></p> <p>Animal Products Act 1999</p> <p>Animal Welfare Act 1999</p> <p>Food Act 2014</p> <p>NZ Horticulture Export Authority Act 1987</p> <p>Policy framework</p> <p>Various science strategies</p> <p>Vision Mātauranga</p> <p>Formal/legal arrangements</p> <p>GIA</p> |

Appendix 2 Capability by sector

Farms, orchards, vineyards, plantations, nurseries, ports, mail centres, conservation

- Staff capability
 - o Informal
 - o Formal

Research/Science/Innovation

- Researchers
- Datawhiz
- Traditional knowledge experts/MM
- Technicians
- Engineers
- Marketing

Policy

- Analysts
- Lawyers
- Thought leaders

Operational

- Regional Councils
- Contractors
- Inspectors
- Kaitiaki (how get there)
- Kaumatua
- Traditional knowledge

Disease management

- Vets
- epidemiologists
- Plant health – botanists, agronomists
- Marine and FW health – scientists, ecologists, hydrologists, geologists, geographers, climatologists
- Traditional knowledge

Education and training

- Teachers
- Lecturers
- Extension workers
- Trainers
- Volunteers

Cross sector

- Leadership – individual

Support sectors

Manufacturing

Innovation hubs

Helicopters

Transporters

Designers

Marketers