



## Myrtle rust — Te Ao Māori Theme 2

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# Executive summary

## The Kaupapa

In 2018 the Ministry for Primary Industries (MPI) commissioned research into myrtle rust (*Austropuccinia psidii*) to address critical knowledge gaps in cultural, social and scientific knowledge relating to the management of myrtle rust in New Zealand (MPI Project 18607). A Te Ao Māori research theme was prioritised to engage Māori within the research, and then to provide an understanding of the cultural impacts and mātauranga (knowledge) that could help inform the current and future management of myrtle rust in New Zealand.

## Key results

This report summarises an iterative engagement process to provide a Te Ao Māori perspective of the cultural impacts of, responses to, and mātauranga to myrtle rust. The process undertaken has provided key culturally based understanding across our four objective areas:

### Regional Hui

A series of nine engagement hui introduced the Myrtle Rust programme to communities in the most affected regions in New Zealand. A general invitation was distributed to the target audience within mana whenua (participating hapū and their respective communities). Although attendance was variable between hui, there was an overall total attendance of 155 participants that included 53 mana whenua representatives.

A kaupapa of flexibility, discussion and sharing (of information and knowledge) identified there were concerns expressed by some mana whenua about sharing sensitive information in an 'open' hui setting. These concerns provided the research team with some very strategic feedback which then directly informed the approach and methods used in the subsequent objectives (surveys, protection plans, mapping, and mātauranga).

Interest in myrtle rust-related kaupapa declined over time, evidenced by the drop in attendance numbers from all sectors and stakeholders (not just reflected by mana whenua attendance). The cause of the decline in numbers was not determined, but may have been due to several factors including a decline in myrtle rust communications, lack of interest and/or familiarity with the issues. It is important for ongoing research and management of myrtle rust in New Zealand to identify causes for the decline in interest.

### Surveys and interviews

Te Tira Whakamātaki (TTW) undertook a survey and interviews with Iwi/Māori to understand their attitudes and values as they relate to the myrtle rust incursion and response, as well as the cultural acceptability of proposed tools, solutions and practices for local elimination and long-term management of myrtle rust. Regionally based TTW technicians (kaitiaki) from across the North Island completed a total of 87 survey interviews, with 45 questions. Of the 87 Māori that responded, the majority were from rural settlements (53%) in the Bay of Plenty (26%), Waikato (24%) and Northland (24%) regions. The age demographics were widespread from 20-70+ with only 2 respondents between 18-19 years of age, and 2 between 25-29 years of age. The gender split was exactly 50% male, and 50% female.

The majority of interviewees (94%) have heard of myrtle rust and understand its impacts to varying degrees. However only a minority (26%) have had a chance to be involved in the response despite the most (88%) being active kaitiaki (currently undertaking unpaid work to help protect the environment) who see a role for themselves and their communities in biosecurity responses. The survey also found the interviewees were acutely aware of biosecurity and pest management tools and techniques, but were largely unsupportive of tools that use toxins, aerial spraying or gene editing techniques. This has implications for any future management of myrtle rust that involves chemical sprays as preventatives for disease spread.

### Protection Plans

This research developed a novel protection plan in response to myrtle rust that enables Māori communities to have conversations about the future of their taonga specimens and sites of

significance. The plan guides Māori communities through a process that defines the desired end state that they want for their identified specimen or site.

Five rōpū-based protection plans in five rohe were completed. This research provided an exemplar or template for a Kaupapa Māori based protection plan that can be tested or incorporated, where appropriate, in the future long-term management of myrtle rust.

The protection plan template identified eight priority issues that could be discussed and assessed by mana whenua rōpū, and their communities, to protect their taonga and rohe from the disease.

The plan also developed six mana whenua rōpū-led solutions and mitigations to manage myrtle rust in their rohe, and provided a response framework for rōpū to identify timelines, activities and resources needs within their rohe. The protection plan template has provided a contemporary adaptive management approach for Māori rōpū and their communities, to test and/or adopt in response to myrtle rust.

## **Mātauranga-Māori Hui**

The declining interest in myrtle rust expressed to the research team over the course of the project prompted the need to refine the methodology for the way information was garnered from the knowledge holders of mātauranga. Further research and engagement models to overcome these issues were identified. However, a number of concurrent initiatives that were engaging Māori researchers, kaitiaki and knowledge holders, such as Biosecurity 2025 and development of the Myrtle Rust Science Plan, identified myrtle rust-related research priorities that will need to be led by or co-developed with Māori in the future. Integrating any information related to Mātauranga Māori with the Kaupapa Māori research priorities within the SSAG Myrtle Rust Science Plan will help to build and align the future co-development of Māori research needs. This will be a vital process to help to implement Myrtle Rust Science Plan.

## **Further work**

While undertaking this project, an increasing number of detections of myrtle rust were concurrently being confirmed in many new rohe (sites and areas) across New Zealand. This rapidly changing scenario meant that there was a corresponding increase in the number of iwi, hapū and whānau and their communities being directly affected by the rust. Undertaking a similar Kaupapa Māori-based research approach within these new rohe will build on the results provided in this report, but also has the potential to establish new opportunities for Māori to engage or contribute to the overall research and management of myrtle rust in New Zealand.

An assessment should be undertaken of how additional protection plans could be developed and adopted by other mana whenua rōpū wishing to implement management of myrtle rust in their rohe.

Our results, while collaboratively shared with other researchers undertaking concurrent myrtle rust research (such as Theme 1 - Building engagement and social licence), still requires a final collation and review across all those themes, to enable an integrated interlinked research framework that prioritises next steps and recommendations for all future research needs to underpin myrtle rust knowledge and management.

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# Contents

Page

<b>1</b>	<b>Project background.....</b>	<b>6</b>
1.1	Whakatauki.....	6
<b>2</b>	<b>Introduction .....</b>	<b>6</b>
2.1	Theme 2. Te Ao Māori.....	6
2.2	Social partnerships.....	7
2.3	Research partnerships & alignment with RFP themes 1, 3 and 4 .....	7
<b>3</b>	<b>Materials and methods .....</b>	<b>8</b>
3.1	Working with Mātauranga (Māori knowledge) and kaupapa (Māori principles and policy).....	8
3.2	Methodology.....	8
3.3	Survey .....	10
3.4	Interviews .....	10
<b>4</b>	<b>Results .....</b>	<b>11</b>
4.1	Regional Hui.....	11
4.2	Surveys and interviews .....	12
4.3	Survey interview methodology .....	12
4.4	Maps and protection plans .....	23
4.5	Mātauranga-Māori Hui.....	31
<b>5</b>	<b>Risks, issues and lessons captured .....</b>	<b>40</b>
<b>6</b>	<b>Discussion .....</b>	<b>41</b>
6.1	Engagement.....	41
6.2	Findings about the myrtle rust response .....	41
<b>7</b>	<b>End user impact .....</b>	<b>43</b>
<b>8</b>	<b>Recommendations .....</b>	<b>44</b>
<b>9</b>	<b>List of Appendices .....</b>	<b>45</b>
9.1	Appendix 1. Hui summaries .....	45
9.2	Appendix 2. IP Plan & Data Management Plan .....	49
9.3	Appendix 3. Protection Plan – Letters.....	50
9.4	Appendix 4. Protection Plan Template.....	50
9.5	Appendix 5. Protection plan – Ngātirua.....	58
9.6	Appendix 6 Protection plan .....	67

# 1 Project background

## 1.1 Whakatauki

Mā te whakaatu, ka mōhio	Through resonance comes cognisance
Mā te mōhio, ka mārama	Through cognisance comes understanding
Mā te mārama, ka mātau	Through understanding comes knowledge
Mā te mātau ka ora	Through knowledge comes life

## 2 Introduction

### 2.1 Theme 2. Te Ao Māori

*Identify Māori values and species-specific aspirations for managing myrtle rust, to inform management options and identify opportunities for Māori involvement. This is a critical input to short- and long-term management*

**Outcome:** Greater understanding of Te Ao Māori implications of myrtle rust, to support more effective investments, and improved use of Mātauranga, specific Māori knowledge, and kaupapa Māori approaches in management regimes

### **Integrating and underpinning New Zealand's response and management of myrtle rust (*Austropuccinia psidii*) with Mātauranga Māori**

Māori have developed practices and methods such as the use of ritenga (customs, laws, and protocols) and whakapapa (species assemblages within a holistic ecosystem paradigm) to mitigate risks and threats to both endemic biodiversity and primary production systems from pests, weeds and pathogens. The 21st Century has seen a rapid increase in species introductions to New Zealand, with dramatic consequences for both Māori livelihoods and cultural integrity.

This research focused on preparing Aotearoa New Zealand for the long-term effect myrtle rust will have on the economic, environmental, and socio-cultural consequences for Māori and their communities, Māori responsiveness to this incursion, and inclusion of mātauranga-based solutions to underpin its future management.

Indigenous Myrtaceae species were extensively utilised by Māori for a wide range of purposes including medicine, construction and food. Myrtaceae species are considered as tāonga species and the Māori relationship with them is one of kaitiakitanga, maramataka, and whanaungatanga; these relationships are multifaceted and intimate, having developed over more than 40 generations (Waitangi Tribunal 2011).

A focus on hapū, iwi and Māori organisational responses to the many emerging biosecurity risks and threats of myrtle rust across both managed and native ecosystems have been outcomes the team has attempted to address in this project. In addition, this project aimed to strengthen partnerships among New Zealand scientists, especially those involved in the programme and Māori communities, and agencies also involved in Myrtaceae protection and management (e.g. Department of Conservation, councils and industry).

The aims of Theme 2 - Te Ao Māori were to:

- elucidate traditional and current knowledge of taonga Myrtaceae (plants, species and ecosystems) that could be used to underpin and develop Māori-led and prioritised preparedness plans;
- determine and unlock innovation in accordance with Mātauranga Māori to protect tāonga Myrtaceae species and sites; and
- identify additional knowledge and practices that could be integrated to improve management and resilience of vulnerable tāonga Myrtaceae.

## 2.2 Social partnerships

Māori organisations, iwi, hapū and community will be resourced, informed and prepared as part of this research. This will also have the capacity to include non-Māori communities and stakeholders such as regional councils and botanic gardens who co-exist in the same rohe and who may also be affected by the myrtle rust incursion.

## 2.3 Research partnerships & alignment with RFP themes 1, 3 and 4

Our team recognised the value and importance of aligning and collaborating with organisations undertaking myrtle rust research within research themes including Building engagement and social licence, Improving management tool & approaches, and Evaluation of impacts and responses. We proposed that Te Ao Māori be interwoven through the entire myrtle rust research programme, as tikanga, and Mātauranga Māori are integral in underpinning progress in and across all the research themes. This was achieved in many ways through the combine hui conducted in the three focus areas across the country and the two additional hui in Te Tairāwhiti and Te Tau Ihu. This project, Te Ao Māori, was one of four projects aligned to the MPI-funded Myrtle Rust programme. Each of the four themes had their individual aims and objectives; however, Te Ao Māori provided the overarching lens from which consultation with Māori was viewed and appraised. The other three themes and their aims and objectives were:

Theme 1 - Building engagement and social licence

- Review of existing knowledge
- Co-inquiry process engaging stakeholders and communities (surveys and focus group meetings)
- Learning case studies to ascertain i) risk perception ii) key networks and groups for targeted engagement iii) relative impact and management options in different areas

Theme 3 - Improving management tool and approaches

- Improved myrtle rust surveillance
- Mapping Myrtaceae distributions
- Review of potential control tools
- Pilot trials of management tools
- Scoping a resistance breeding programme

Theme 4 - Evaluation of impacts and responses

- Development of indicators for environmental, economic and socio-cultural systems to evaluate consequences of myrtle rust in New Zealand
- Scope potential environmental and economic consequences of myrtle rust in New Zealand using a modelling framework

Aligned to the MPI-funded programme was the RSNZ Catalyst-funded project, with a separate set of aims and objectives. These were:

- Understanding the pathogen, hosts, and environmental influences
- Testing of native and important exotic host species susceptibility against the pandemic *Austropuccinia psidii* strain in Australia (Queensland)
- Risk assessment of New Zealand Myrtaceae against other *A. psidii* strains (testing in Uruguay and South Africa)
- Epidemiology of myrtle rust in New Zealand conditions
- Identification of genetic markers linked to resistance
- Determine the role of New Zealand Myrtaceae endophyte communities against myrtle rust

*Austropuccinia psidii* genome sequencing

- Sequencing and analysing the genome to reveal potential mechanisms of pathogenicity that can be targeted by breeding or other responses
- Determining the differences between different strains of *A. psidii*

Improving management tools and approaches

- Investigating alternative methods to storage of seed or germplasm for conservation of high-risk species and to ensure future access to genetic variation

The information and the associated material produced in the other themes was able to assist Kaitiaki with their communities and organisations to inform their decision making when faced with the prospect of taonga species being infected or worse still, killed.

Again, most of the consultation and approval process was conducted alongside the Te Ao Māori team, with project members present at most of the combined hui.

Furthermore, members of Theme 2 - Te Ao Māori are already collaborating with a wide range of relevant researchers and organisations who are undertaking research within the myrtle rust themes (e.g. Plant & Food Research; Scion; Maanaki Whenua Landcare Research; Bioprotection Research Centre) as well as the Biological Heritage Science Challenge which has been funding an aligned project on myrtle rust since 2016 (Project Leader Amanda Black, supported by objective leaders Alby Marsh and Peter Scott).

### 3 Materials and methods

Our research is Kaupapa Māori-centred; led by Māori, for Māori and with Māori. The important aspect of Kaupapa Māori Research is that it seeks to understand and represent Māori, as Māori. Using a mixed-methods process involving Māori, researchers and stakeholders, in action research which included interviews, a survey, focus groups (hui/wānanga), mapping and analysis, as well as impact and response assessment in the form of long-term management plans for regions. We worked with a range of rūpu Māori and individuals which included:

- Te Tira Whakamātaki, the Māori Biosecurity Network including their executive team, researchers, and members, but specifically their biosecurity leads and technicians
- Iwi leaders Pou Taiao Advisors Rōpū
- Various hapū and iwi.

#### 3.1 Working with Mātauranga (Māori knowledge) and kaupapa (Māori principles and policy)

A key requirement of the project was the need to engage Māori and identify opportunities for Māori involvement, including Mātauranga (Māori knowledge, principles and policy), in the Myrtle Rust research programme. This project brought together individuals from multiple organisations, all of whom have been involved in research and Māori engagement in the last five years, some much longer. Collectively our expertise in Māori research design and management including Kaupapa Māori research, Māori community and participatory process, strategic decision making, facilitation, systems thinking, and experience working with or for National Science Challenges, Centres of Research Excellence, Universities, CRIs, regional councils, hapū and iwi was a strength the team brought to the project.

In keeping with Kaupapa Māori research methodologies and as already noted, our desire was to include Māori researchers and communities/stakeholders in the development and implementation of this kaupapa.

#### 3.2 Methodology

We note that for any participatory and collaborative process to work it needs to be tailored to the facilitating group, the participants, and the topic under consideration. While a range of processes can work, no one process is necessarily better than another – with the fit among these three ingredients



being important. This is why we focused on developing a working environment built on the key concepts of:

- **Whānaungatanga** - where we establish and maintain positive relationships
- **Manaakitanga** - where we are hospitable, fair and respectful of each other
- **Kotahitanga** - where we progressively act in unity, with purpose and direction, and where people are encouraged to make a contribution, to have their say and then together reach a consensus
- **Mana Tūpuna/Whakapapa** – where we honour our past, the present and the future, by analysing and synthesising information and knowledge.

Additionally we used several areas involving emerging technologies, frameworks and tools that we believed could be profitably explored to assess their potential for improved participatory process design in this research. These were:

- **Kaupapa Māori** – In a Kaupapa Māori Research paradigm research is undertaken by Māori, for Māori and with Māori, the important aspect of Kaupapa Māori Research being that it seeks to understand and represent Māori, as Māori.
- **Systems thinking** – provides for all parties to be thinking the same way, and understanding one another more quickly and efficiently. There are a range of tools and techniques to support system thinking; all have the capacity to enable groups to quickly develop both a shared understanding and an appreciation of divergent stakeholder viewpoints.
- **Scenario development** - Recent developments are broadening the use of scenario development to start looking at both bio-physical and actor-oriented modelling. This enables all parties not only to see what might change on the ground, but also to assess how different stakeholders might react to proposed changes. In this way the process can provide for a deeper level of ‘community-based’ discussions around different pathways and choices.
- **Participatory modelling** embraces both systems thinking (for problem scoping) and scenario development (for strategic thinking). A broad suite of approaches can be used to support modelling that goes beyond classic data-rich and highly technical approaches. Modelling can involve public participation to generate systems diagrams – e.g. rich pictures, timelines, causal loop modelling.
- **Outcomes-based approaches** can assist by supporting diverse stakeholders to work together and plan for outcomes by envisaging a ‘big picture’ view of how and why a desired change is expected to happen in a particular context. Used within a wider Theory of Change process they help participants to understand the social change required, and also aid the development of monitoring and evaluation plans to support adaptive management.
- **Community engagement** – Current efforts in wider community engagement typically find it hard to go beyond meeting with familiar contributors to ascertain generic values and concerns. Using a wider range of system thinking tools, improved scenario narratives, and appropriate participatory modelling techniques allows for increased and more diverse opportunities for community engagement. Similarly, new developments in linking technical, traditional and local knowledge, and new approaches to distributed engagement for policy development (including but not limited to social media) mean there are a large number of underutilised options for improving connection of the strategy process with wider community and stakeholder involvement.

Collectively our team had familiarity with these tools/areas, and equally importantly we brought strong collaborative links with other individuals and organisations who can offer critical expertise in developing these further.

### 3.3 Survey

We assessed the attitudes, beliefs/aspirations, and practices of Māori affected by and those likely to be affected by myrtle rust. A cross-sectional survey approach used questionnaires designed to seek information about a particular topic, myrtle rust, at a particular point in time. The survey utilised choice modelling to determine preferred management options but was based in the Theory of Planned Behaviour<sup>1</sup> which states that behaviour is influenced by attitudes, norms and perceived control. This Theory has been effective for engaging the public with pest species surveys in the past.

### 3.4 Interviews

Semi-structured interviews using a key informant approach were conducted. These were conducted in a culturally appropriate manner (e.g. adhering to tikanga for elders<sup>2</sup>) to provide a deeper understanding of mātauranga around managing biosecurity incursions. Where possible interviews were recorded and transcribed fully and findings analysed using 'ground theory'<sup>3</sup> approach where categories and explanations are generated as the researchers explore the data. Open coding based initially on the interview protocol allowed for the development of emerging themes<sup>4</sup>. During the coding process, we used Cohen Kappa methodology to test inter-coder reliability and ensure that resulting findings are robust.<sup>5</sup>

A series of hui were conducted in the regions where the information was collected to report the findings of our work and the work of the other themes. Whilst the sharing of information is important in understanding the impact of Myrtle Rust on Māori and their response, it is also important that sensitive information such as kawa and mātauranga of an iwi response is preserved.

Surveys and interviews were conducted between April and June 2019. Surveys were conducted by Te Tira Whakamātaki (TTW)'s regional biosecurity leads/technicians and coordinated by TTW's General Manager Thomas Malcolm. Survey development was managed by Nick Waipara, built from the survey work already conducted and extended by TTW CEO Melanie Mark-Shadbolt.

The RfP specifically asked for information on how the team will manage certain risks (e.g. limitations of data, bias). All research has limitations on it, primarily because the researcher cannot control everything, and indigenous and social research can be particularly challenging. We strove to minimise the range and scope of limitations throughout the research process, and we will acknowledge our research limitations in our research report. Limitations of concern and measures for mitigation include:

- *Managing bias in data collection.* The team recognised that all Māori are affiliated to iwi and hapū so it is hard to avoid Māori affiliated to iwi or hapū. Additionally those who are most likely to be affected by myrtle rust included landowners, managers and or kaitiaki of traditional sites typically involved in iwi and hapū affairs. Those Māori were in fact the ones who need to be engaged, given they are the ones who are likely to implement and resource the long-term management of the myrtle rust incursion.
- *Sample size is often a limitation for indigenous research.* Improper representation of the target population could legitimately be considered a limitation; however, this was not a factor in this project, given the generous sample sizes in this research (1000+ Māori in our last survey, and over 30 Māori biosecurity and Kauri Dieback interviews).
- *Data analysis cannot be standardised.* It is important to note that qualitative approaches help with the how and why questions; they aim to explain why people think and behave in certain ways. Quantitative approaches are best used to answer what, when and who questions; they help us understand how many people think or behave in certain ways. Each approach requires different approaches to data analysis.

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<sup>1</sup> Ajzen, I. (1991). *Theory of planned behaviour*. Organizational behavior and human decision processes, 50(2), 179-211.

<sup>2</sup> Smith, L.T., *Decolonizing methodologies: Research and indigeneous peoples*. ZED Books;University of Otago Press New Your, Dunedin, 1999.

<sup>3</sup> Service, R.W., *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, 3rd edition. *Organizational Research Methods*. 2009, 12, (3), 614-617.

<sup>4</sup> Brynman, A., *Social research methods*. Oxford University Press, Oxford: 2001.

<sup>5</sup> Muter, B.A., Gore, M.L., Riley, S.J., From victim to perpetrator. Evolution of risk frames related to human-cormorant conflict in the Great Lakes. *Human Dimensions of Wildfire*. 2009, 15, (5), 366-379.

## 4 Results

### 4.1 Regional Hui

#### Hui – Dates and Locations

- Hui 1 – Taranaki – 16 July 2018 – Spotswood College – New Plymouth , 16 Attendees (Mana Whenua – 3)
- Hui 2 – Waairiki – 17 July 2018 – PFR Te Puke, Te Puke, 25 Attendees (Mana Whenua – 5)
- Hui 3 – Te Taitokerau – 19 July 2018 – PFR Kerikeri, Kerikeri, 23 Attendees (Mana Whenua – 15)
- Hui 4 – Te Tairāwhiti – 02 November 2018 – Hinerupe Marae, Te Araroa, 23 Attendees (Mana Whenua – 12)
- Hui 5 – Te Tau Ihu – 11 March 2019 – MPI Nelson, Nelson - 12 Attendees (Mana Whenua – 8)
- Hui 6 – Te Tau Ihu – 11 March 2019 – PFR Nelson, Nelson – 7 Attendees (Mana Whenua – 1)
- Hui 7 – Te Taitokerau – 01 April 2019 – Takau Marae, Takau - 24 Attendees (Mana Whenua – 8)
- Hui 8 – Waairiki – 02 April 2019 – PFR Te Puke, Te Puke –17 Attendees (Mana Whenua – 1)
- Hui 9 – Taranaki – 03 April 2019 – The Devon Hotel, New Plymouth – 8 Attendees (Mana Whenua – 0).

The initial series of hui were about introducing the Myrtle Rust programme to people and communities in the most affected regions around the country. This is a variation to what is described above, as these hui were conducted prior to being contracted. The rationale for the change was twofold:

- to prevent “hui fatigue” by engaging the same people on similar themes in a short space of time
- at the time of the hui we were operating without a budget and did rely on the other themes to support some logistical costs. It was because of this inclusiveness of the other themes that the programme became broader in its scope.

A general invitation was distributed to the target audience of regional leads and technicians, and participating hapū, in the regions where hui were conducted; however, attendance was variable in most locations visited. Our intention is to be flexible in how we conduct our hui and how and what we present, with the aim to encourage discussion and feedback. As has been the case with many hui in which we have engaged Mana Whenua, there has always been a reluctance to share sensitive information. This being the case with most of these hui. The hope is that some of this information will be drawn out in ensuing hui with key individuals.

#### Summary

The original intention, to conduct a series of regional hui with regional leads and technicians, and participating hapū, to identify priority taonga sites, species and specimens for surveillance and protection, did not eventuate. This change occurred more out of a need to have a wider engagement kaupapa involving team members from across the entire Myrtle Rust programme rather than a Māori-specific kaupapa. This inclusive approach enabled all themes within the programme to have an extended reach, beyond just Māori, with those attending able to appreciate all research being embarked upon. In many ways, this was the team's response to a request received at earlier hui. It was also a better use of time and resources.

What was also learnt at earlier hui was the reluctance of Mana Whenua and in particular individual representatives of those groups to share sensitive information in an open forum. This has affected the way in which certain information is collected and required added flexibility to how it is now done. Extra questions were added to the surveys and interviews conducted by TTW addressing the priority taonga question.

The recent series of hui observed a drop in attendance numbers from all sectors. With Myrtle Rust not being front and centre of every one's minds any longer, there may be a degree of complacency creeping in, more so in the regions where there was a hive of activity prior to the shift to long term management (LTM). The team also observed a sharp decline in the amount of surveillance data being reported. This will affect Māori's ability to map myrtle rust movement and impacts, especially in affected regions, and to keep all sectors of the community informed.

## 4.2 Surveys and interviews

### 4.2.1 Background

Te Tira Whakamātaki was contracted to assist whānau and hapū to develop protection plans for myrtle rust incursions in their rohe, and conduct surveys/interviews with Māori to understand their attitudes and values as they relate to the myrtle rust incursion. Below is a summary report of those activities (those highlighted) that align with the engagement section of the work programme.

### 4.2.2 Objectives of the surveys and interviews

This survey interviews were designed in the first instance to ascertain Māori views of myrtle rust and its impacts on taonga sites and specimens, as well as the cultural acceptability of proposed tools, solutions, and practices for local elimination as well as the management of myrtle rust in the long term (see Appendix 6). To gain a broad understanding of views and attitudes however, a broad set of questions were asked. In particular questions were asked to understand: the importance of protecting the environment; attitudes towards pest management its tools and those who make decisions; and biosecurity issues and biosecurity incursions, including myrtle rust.

Baseline data around the views and attitudes Māori have towards pest management were collated in 2017/2018, which allowed us to compare and contrast the myrtle rust-specific results to see if they aligned with wider pest management attitudes.

### 4.2.3 Survey interview development

Baseline data on Māori attitudes towards biosecurity and pest management were gathered in the first instance by Te Tira Whakamātaki (TTW) in 2017/2018. In total, 1015 Māori surveys were undertaken across the country, alongside a wider pest management survey of 7000+ non-Māori, in conjunction with the Department of Conservation, TTW, Manaaki Whenua Landcare Research and Victoria University of Wellington.

A second more targeted biosecurity and myrtle rust survey (conducted between April and June 2019 for this project specifically), was developed based on the baseline data. This survey interview targeted established *kaitiaki* (guardians) and environmental technicians who actively work in the ngahere (bush), have experience of biosecurity and pest management programmes, and knowledge of myrtle rust.

Eighty-seven survey-based interviews were conducted by six Te Tira Whakamātaki *kaitiaki* as noted in Table 1 below. These regionally based technicians were chosen because of their environmental expertise, work in the wider biosecurity and pest management space, and standing in their communities.

Baseline data were analysed by a statistician, behavioural psychologists, and Kaupapa Māori researchers. Data from these survey interviews, including specific myrtle rust data, were compared by TTW social scientists with the baseline data, and then peer-reviewed by international researchers.

**Table 1: Te Tira Whakamataki kaitiaki who conducted the survey interviews.**

Kaitiaki	Region
Juliane Chetham	Te Tai Tokerau/Northland
Waitangi Wood	Tāmaki Makaurau/Auckland (Pan-tribal kaitiaki and rangatira)
Wanda Bjiljevich	Coromandel
Vivienne Robinson	Te Puke/Bay of Plenty
Tyne-Marie Nelson	Ngāti Kahungunu/Hawke's Bay
Tina Ngata	Te Tairāwhiti/East Coast North Island

## 4.3 Survey interview methodology

A cross-sectional survey approach used questionnaires designed to seek information about a particular topic, myrtle rust, at a particular point in time. The survey used open, closed and partially closed questions on a predominantly five-point stem to determine preferred management options, but was based largely on the Theory of Planned Behaviour<sup>6</sup> which states that behaviour is influenced by

<sup>6</sup> Ajzen, I. (1991). *Theory of planned behaviour*. Organizational behavior and human decision processes, 50(2), 179-211

attitudes, norms and perceived control. This Theory has been effective for engaging the public with pest species surveys in the past.

Semi-structured interviews using a key informant approach were conducted in a culturally appropriate manner (e.g. adhering to tikanga for kaumatua<sup>7</sup>) to provide a deeper understanding of mātauranga around managing biosecurity incursions. Where possible interviews were recorded and transcribed fully and findings analysed using 'ground theory'<sup>8</sup> approach where categories and explanations are generated as the researchers explore the data. Open coding based initially on the interview protocol allowed for the development of emerging themes<sup>9</sup>. During the coding process, Cohen Kappa methodology was used to test inter-coder reliability and ensure findings were robust.<sup>10</sup>

#### 4.3.1 Protection of Mātauranga

While conducting Kaupapa Māori research there is always the risk that Māori participants provide information that they do not wish to have publicly disclosed. This can be a major limitation on the acquisition of data but not one we are unfamiliar with, given our extensive work in this space.

To address this limitation participants were informed at the beginning that their information would remain anonymous because no identifying information would be collected, and any information that could potentially link responses to people would be hidden in secure files and destroyed as per the data management plan created by TTW. In addition, the covering sheet to the survey interviews noted that participants had the right to decline to answer any question and or stop the survey interview at any time. It also noted, however, that because the information was anonymous, they would be unable to withdraw information at a later date.

However, our standard view on Māori data is that the collected information may be used and available via project reports and project presentations that are internal to the research project and the research organisations to which it is affiliated, in this case Plant & Food Research, Scion Research & MPI. However, reports, presentations, communications and publications that are external to those organisations, along with new/subsequent funding and research applications, require further discussions with participants or their representatives, and written consent.

#### 4.3.2 Myrtle rust survey interview results and analysis

In 2019 a pest management survey was conducted that was more qualitative in design and focused more specifically on myrtle rust and biosecurity incursion responses. Designed by TTW researchers and based largely on the baseline survey conducted in 2017/2018, it was conducted by six regional technicians who specifically target *kaitiaki* (guardians) with biosecurity knowledge. The technicians ran the survey in part as an interview, where respondents could choose to respond via electronic survey, or via phone or face-to-face interview. This was done in large part to challenge the results of the baseline survey that was purposefully generic, meaning it included proportionately correct numbers of Māori in urban and rural areas. This meant that the baseline survey potentially lessened the views of active *kaitiaki* (guardians).

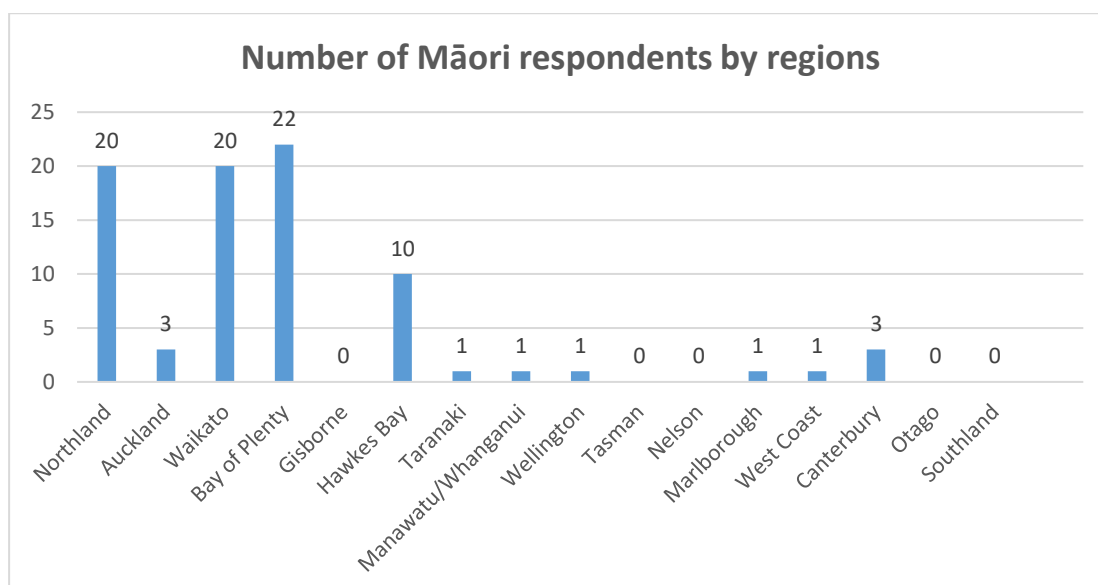
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<sup>7</sup> Smith, L.T., *Decolonizing methodologies: Research and indigeneous peoples*. ZED Books;University of Otago Press New York, Dunedin, 1999.

<sup>8</sup> Service, R.W., *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, 3rd edition. *Organizational Research Methods*. 2009, 12, (3), 614-617.

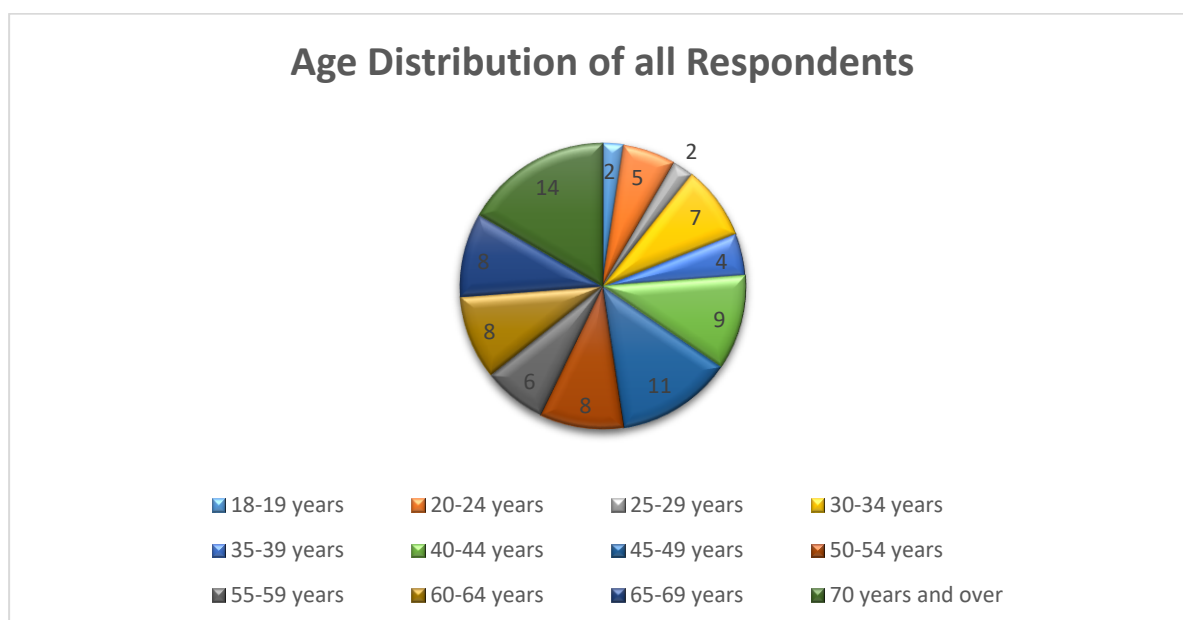
<sup>9</sup> Brynman, A., *Social research methods*. Oxford University Press, Oxford: 2001.

<sup>10</sup> Muter, B.A., Gore, M.L., Riley, S.J., From victim to perpetrator. Evolution of risk frames related to human-cormorant conflict in the Great Lakes. *Human Dimensions of Wildfire*. 2009, 15, (5), 366-379.



**Figure 1: Number of Māori by region (Myrtle Rust data).**

The aim of this study was to ascertain Māori views, specifically those of active *kaitiaki*, of myrtle rust and its impacts on taonga sites and specimens, as well as the cultural acceptability of proposed tools, solutions, and practices for local elimination as well as the management of myrtle rust long-term. 87 Māori from across the country responded, the bulk of whom were from rural settlements (53%) in the Bay of Plenty (26%), Waikato (24%) and Northland (24%) regions (Figure 1). The age demographics were widespread from 20-70+ with only 2 respondents between 18-19 years of age, and 2 between 25-29 years of age (Figure 2). The gender split was exactly 50% male, and 50% female. (Note: 3 respondents did not provide their age)



**Figure 2: Age distribution of respondents (myrtle rust data).**

This survey sought to understand conservation behaviour by beginning with questions that examined the respondent's activities in paid or unpaid environmental work. In this survey 55% of respondents had undertaken paid work to help to protect the environment (compared with 9% in the baseline survey) (Figures 3 and 4). Significantly 88% of respondents had undertaken *kaitiaki mahi* (unpaid, volunteer) work to help to protect the environment. (Note: 4 respondents did not provide their region)

8. Are you currently, or have you ever, undertaken paid work to help protect the environment?

8

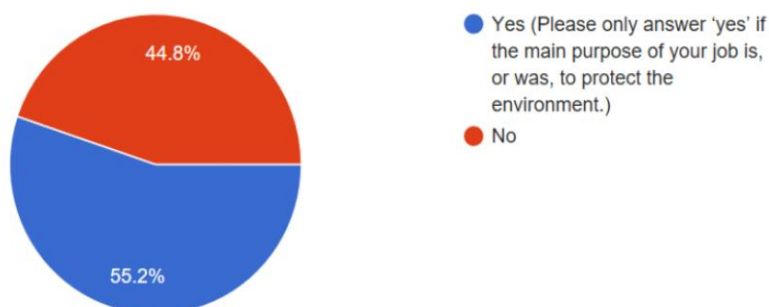


Figure 3: Paid work undertaken by respondents to protect the environment (Myrtle Rust data).

9. Are you currently, or have you ever, undertaken kaitiaki mahi i.e. unpaid (volunteer) work to help protect the environment?

8

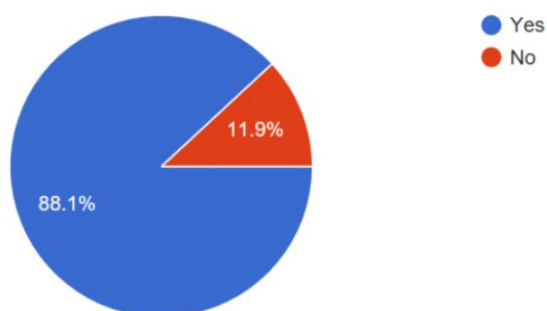
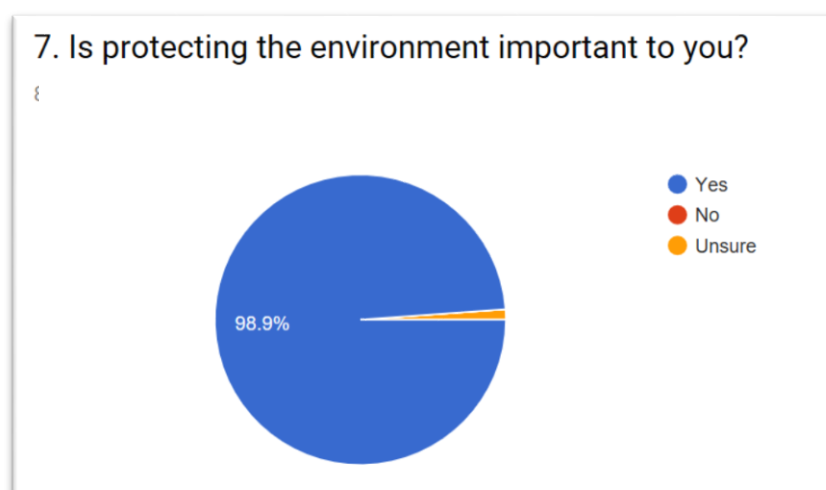


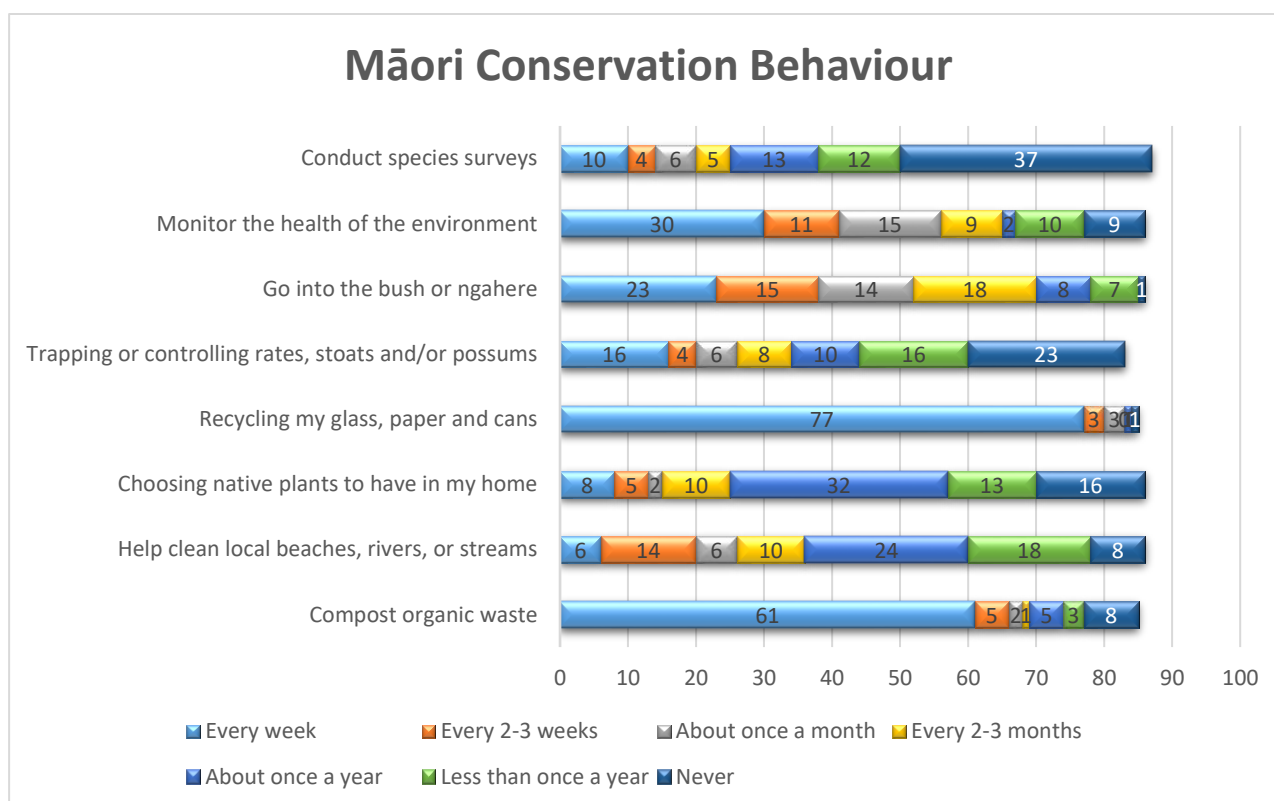
Figure 4: Unpaid (kaitiaki mahi) work undertaken by respondents to protect the environment (Myrtle Rust data).

*Kaitiaki mahi* took many forms, from beach and marine clean-ups (27%), river and waterway clean-ups (8%), pest eradication (10%), to weed eradication (6%), planting and revegetation (17%), monitoring and species counting (5%), harvesting, recovering, saving whales and dolphins (3%), seed collection (6%), and other (18%). This large body of *kaitiaki mahi* correlates with the importance placed on protecting the environment by respondents (99%) (Figure 5).



**Figure 5: Importance of protecting the environment (Myrtle Rust data).**

The Myrtle Rust survey interview chose to examine varying conservation behaviours, including composting, recycling, trapping or controlling pests, and helping in clean-ups (it excluded carpooling). However, it also added conducting species surveys, monitoring the health of the environment, and going into the *ngahere* (bush). Unlike the baseline survey where very few respondents were ever involved in trapping or controlling rats, stoats and or possums, or helping to clean local beaches, rivers or streams. Respondents in this survey were largely active in some form of conservation behaviour. As an example, in the baseline survey 64% of Māori had never contributed to trapping or controlling pests, whilst in the later survey interview only 28% had not been involved in trapping or controlling pests (Figure 6). Of significance to the myrtle rust programme, 27% of *kaitiaki* respondents went into the bush weekly, and 60% of *kaitiaki* respondents went into the bush at least once a month. This makes them a useful in ongoing myrtle rust surveillance.

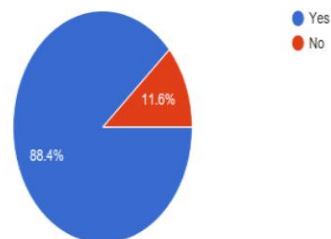


**Figure 6: Māori conservation behaviour (Myrtle Rust data).**



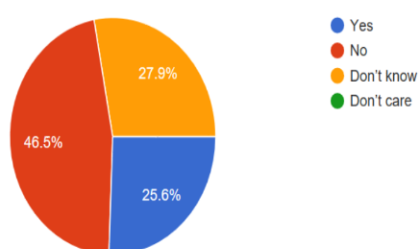
The Myrtle Rust survey interview also asked respondents if they had heard of the Government's initiative to rid New Zealand of predators by 2050, and 88% of the respondents had heard about the initiative, compared with 52% in the baseline survey 16. However, despite the fact that 86% thought invasive species should be eradicated (Figure 7), only 47% of the respondents thought it was achievable, and a further 28% did not know (Figure 8). This highlights the environmental awareness of active *kaitiaki*. They know what is going on and are realistic about the outcome.

12. Have you heard about the government's initiative to rid New Zealand of predators by 2050?



13. Do you think it is achievable?

86 responses



14. Do you think we should eradicate invasive species?

34 responses

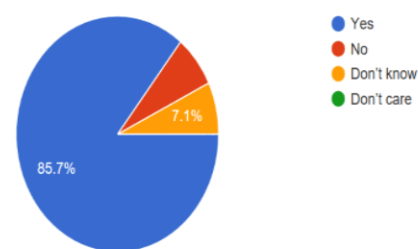


Figure 7: PF2050 is it achievable (Myrtle Rust data)?

Figure 8: Eradicating invasive species (Myrtle Rust data).

The Myrtle Rust survey interview respondents were also worried about plant diseases like kauri dieback and myrtle rust. Equally respondents were worried about possums, stoats, rats and cats. However, deer, wasps and pigs were not a real concern (Figure 9). The data point to respondents of the survey interview being far more concerned about pest threats than baseline respondents were.

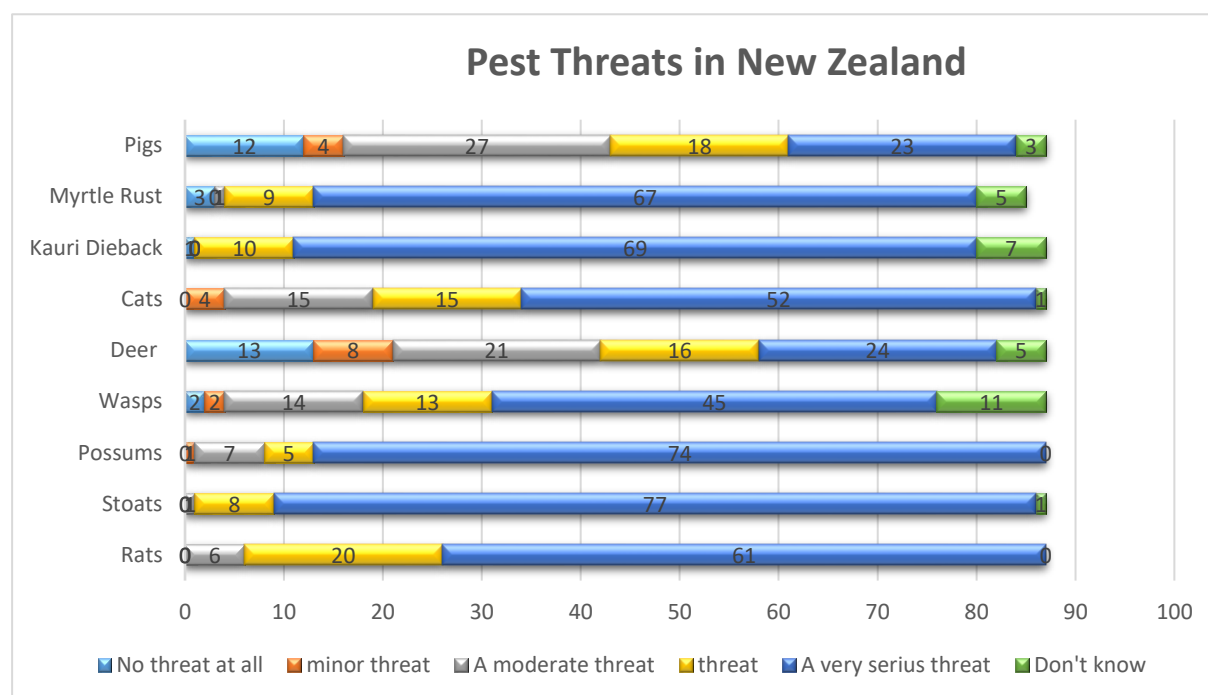
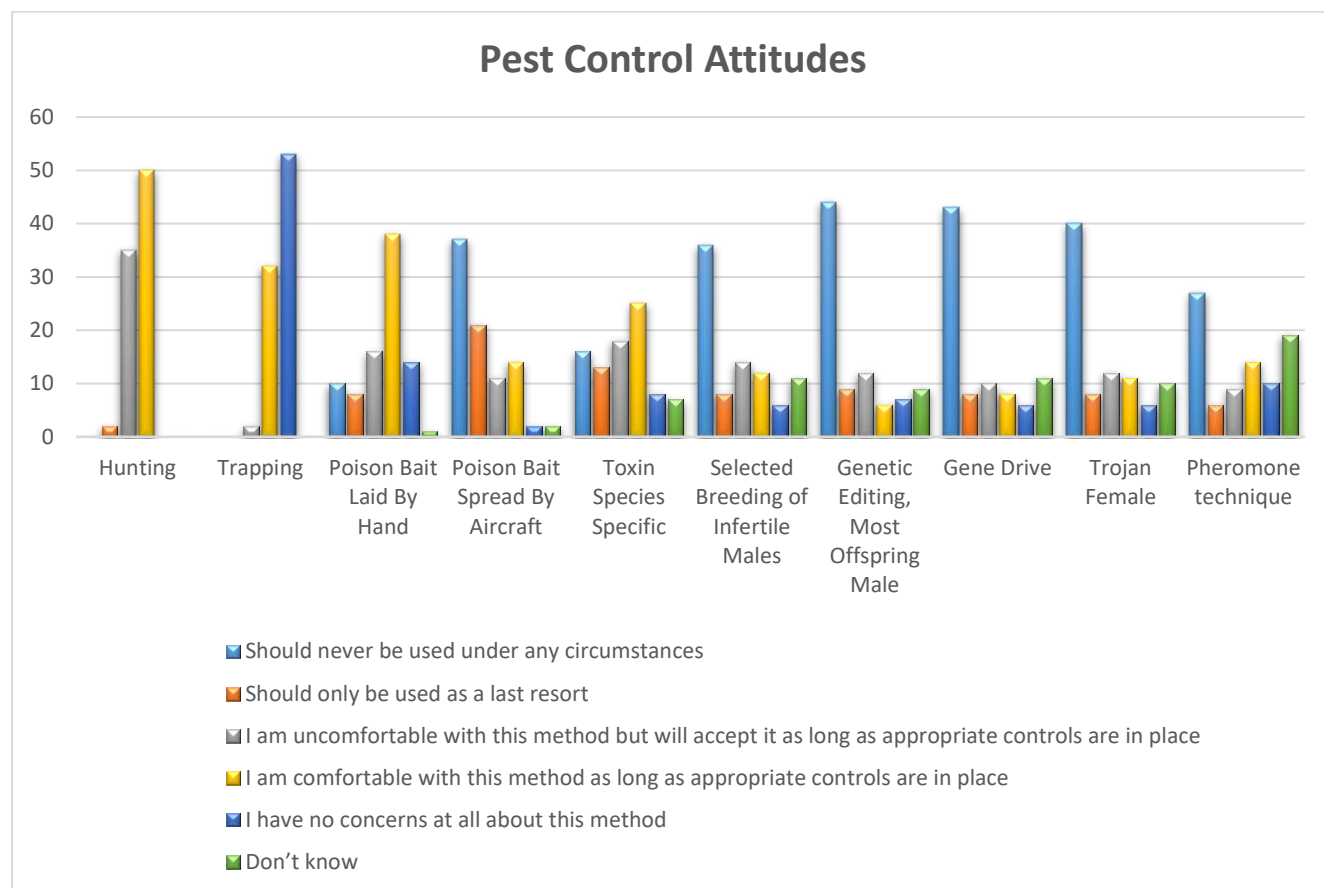


Figure 9: Pest threats in New Zealand (Myrtle Rust data).

When it came to considering how we control pests, Myrtle Rust survey interview respondents were far less tolerant of tools such as poison bait being spread by aircraft, selective breeding resulting in infertile males, genetic editing resulting in most offspring being male, gene drives, and trojan female techniques. The results lean towards a conclusion that active *kaitiaki* are less supportive of tools and technologies that are either gene- or toxin-based, especially if they are spread aerially (Figure 10)



**Figure 10: Pest control attitudes (Myrtle Rust data).**

To determine whom respondents might trust to lead environmental decision-making in Aotearoa New Zealand, Myrtle Rust survey interview respondents were asked to rank their top four selections in order of importance of the most preferred leaders, to the least preferred leaders. In order, respondents stated: Iwi or *hapū* entities, communities (self-organised), Ministry for the Environment, Other, Environmental not-for-profits, Ministry for Primary Industries, Councils, and Department of Conservation (Figure 11). Unfortunately, this cannot be directly compared with the baseline survey which ranked trust in the following order: scientists, iwi leaders, local councils, business leaders, elected officials, Government agencies, media and news journalists, religious leaders.

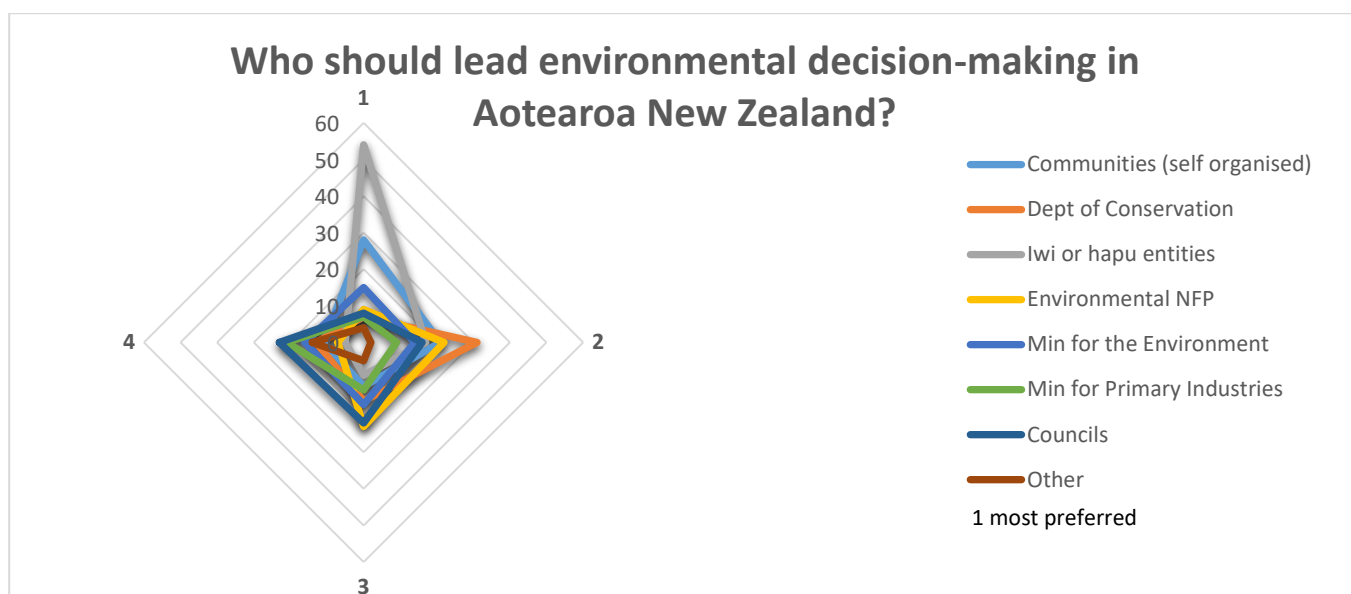


Figure 11: Leading environmental decision-making (Myrtle Rust data).

When asked what factors influenced the respondents' decision making regarding protecting New Zealand's natural environment in both the baseline survey and Myrtle Rust survey interview, *whānau* wellbeing was the most important factor and financial considerations was the least important. However, the importance of the other factors differed between the two surveys. Active *kaitiaki* were much more considerate of tikanga and the Treaty of Waitangi in environmental decision-making than the wider, non-active Māori surveyed in the baseline survey (Figure 12).

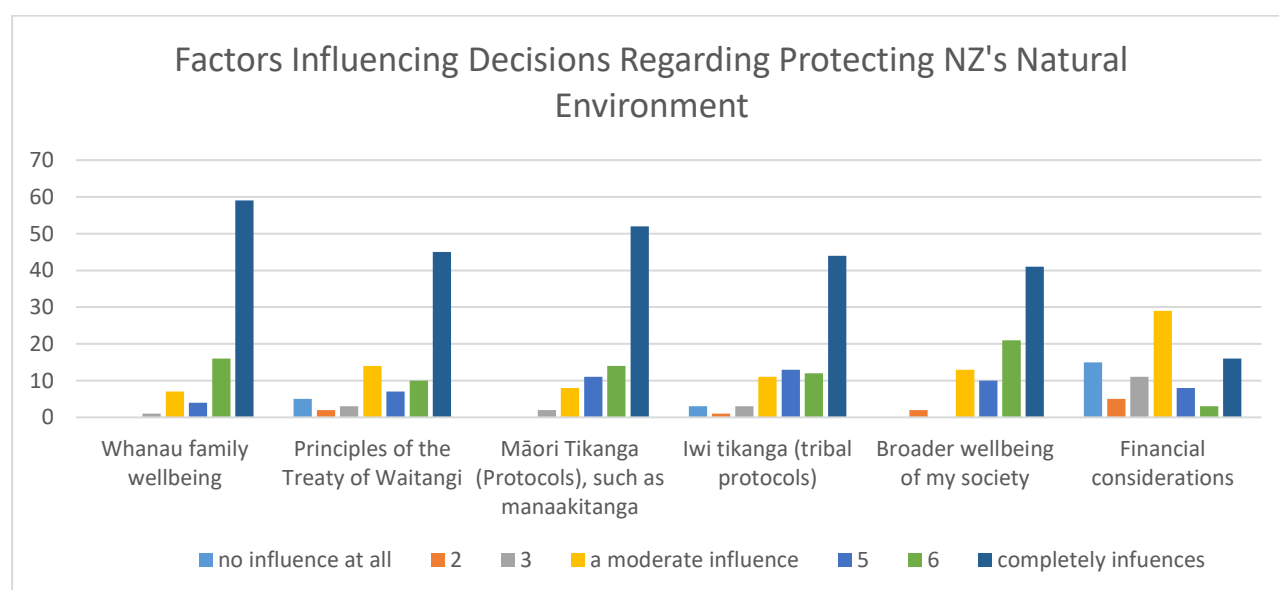


Figure 12: Factors influencing decision-making (Myrtle Rust data).

When it came to biosecurity knowledge and technology preferences, 87% of respondents to the Myrtle Rust survey interviews could name a biosecurity issue, and most respondents felt strongly about biosecurity. It is important to them, and they believe that they have a role in ensuring pests and diseases do not enter the country, or if they do, that they do not spread (Figure 13). As active *kaitiaki* of land, flora and fauna, these respondents had a slightly stronger reluctance to use new technologies than those in the baseline survey. However, the differences were minor, which could imply that a lack of information automatically results in resistance.

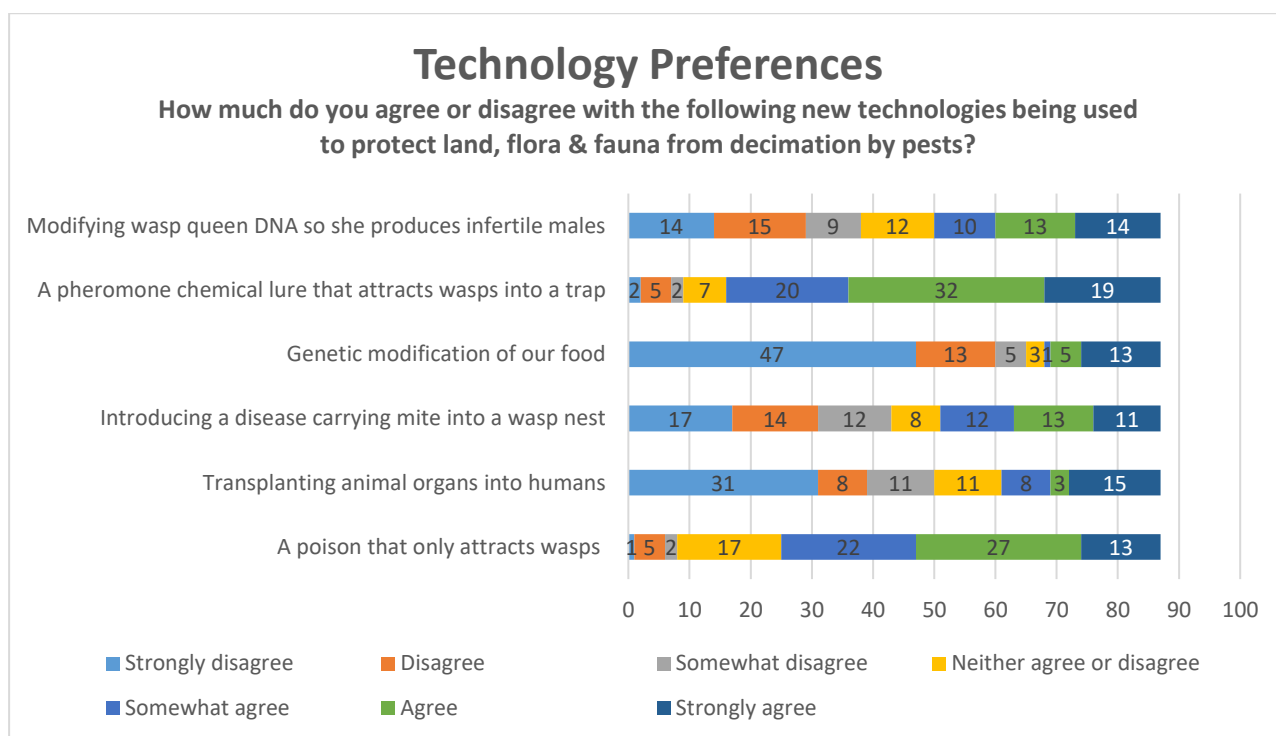


Figure 13: Technology preferences (Myrtle Rust data).

Respondents were also asked to rank, in order of importance, what should take priority when planning pest control. Overwhelmingly the wellbeing of our native *taiao* (environment) ecosystems was prioritised as the most important consideration, followed by maintaining food systems (both native and introduced), involvement of *hau kainga* (home people, local people of a *marae*), and income for *hau kainga* (Figure 14).

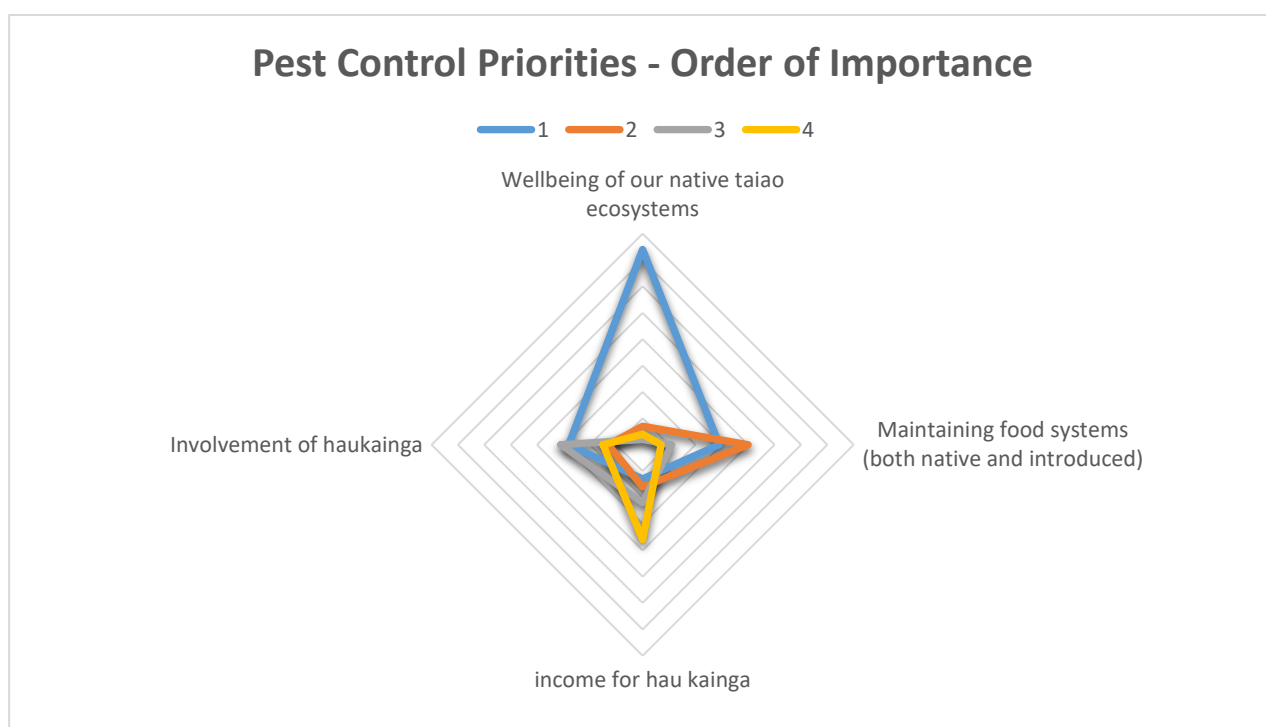
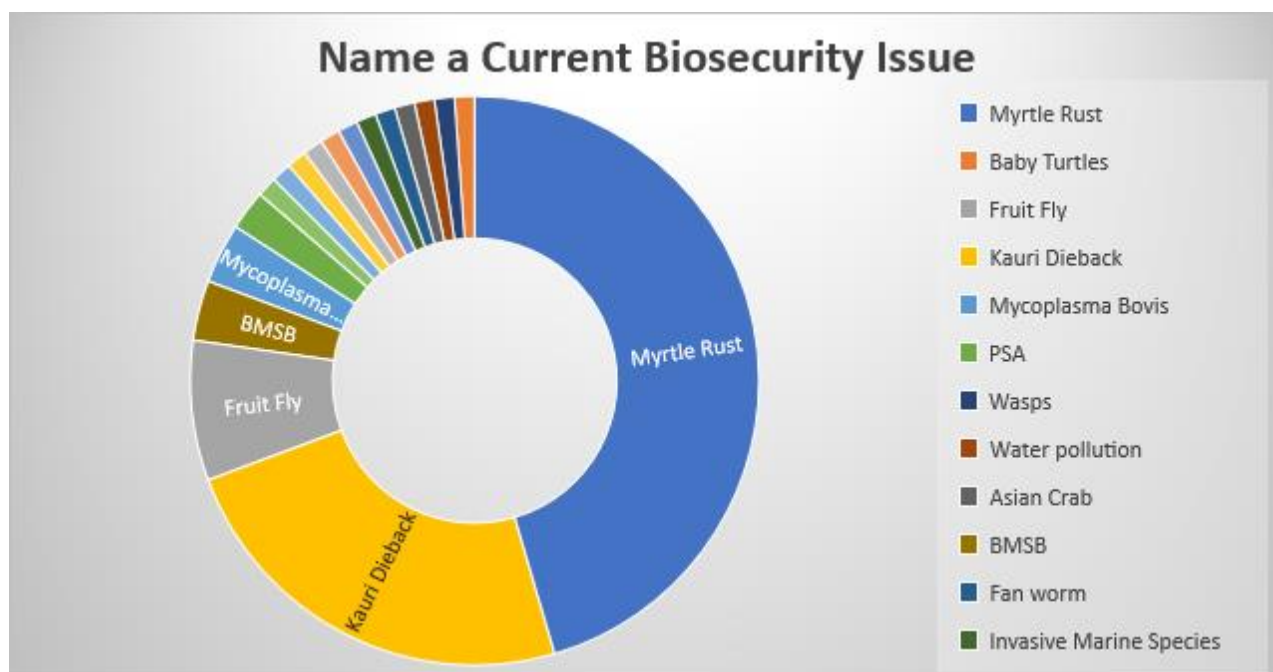


Figure 14: Pest control priorities (Myrtle Rust data).

When it comes to Myrtle Rust specifically, respondents of the survey interviews answered a set of questions about the incursion and response. As noted earlier 87% of respondents could name a biosecurity incursion, and 94% had heard of myrtle rust. When asked to name a biosecurity issue, plant pathogens featured heavily (Figure 15).



**Figure 15: Current biosecurity issues named (Myrtle Rust data).**

The survey interviews captured large amounts of data about what *kaitiaki* had heard about myrtle rust and from whom. The wider media, ministries and agencies, scientists, *iwi* and *hapū*, and Te Tira Whakamātaki featured quite heavily. Of those *kaitiaki* who became involved in the response, many did so at the request of others, be they scientists, *iwi/hapū*, agencies/ministries, or Te Tira Whakamātaki, and a significant percentage were supported to respond via encouragement or resourcing. Surveillance training, funded by MPI and coordinated by TTW, featured heavily in the responses, as did participation in the development of protection plans. When asked why *kaitiaki* wanted to be involved in the response, the main reason expressed was a concern for the survival of taonga species. *Kaitiaki* largely named TTW as the group essential to developing constructive interactions or enabling them and others to be involved in the myrtle rust response; others named included Kew Gardens, the Millennium Seed Bank Partnership, MPI Director of Communications, Biological Heritage National Science Challenge, MPI and DOC.

When asked what kinds of constraints or barriers *kaitiaki* had personally experienced that limited their involvement or effectiveness in the myrtle rust programme, the consistent message was lack of time, lack of funding, lack of communication, and a lack of capability in the agencies for them to be able to engage effectively with Māori (Figure 16).

Lack of cultural competency, racism, ignorance, unwillingness to relinquish control, resource allocated to agencies that are invested in keeping their people employed instead of investing in the capability of *kaitiaki*, who are the true solution to address regional response, the need of agencies to create narratives about how well they are doing, when what *whanau/hapu/iwi*, industry and community need is good information about myrtle rust. The myopia that we have to live with it, will resonate and people then can abdicate any responsible for eradicating or managing. The disconnect between what science is saying and what MPI is doing. The Biosecurity System which relegates *tangata Maori* to pest trappers and plant monitorers, lack of national and regional coordination that gives effect to *Te Tiriti O Waitangi*. The inference in plans on 'iconic species', so elevating the importance of *taonga* like *Tane* to the detriment of my forest which at this stage is not iconic. Allows resourcing and funding to be weighted to those forests that are tourist centric. the irony is that this strategy increases vectors (People) into infected forests, who then travel to uninfected *kauri* forests without any investment (no walkways, signs, cleaning stations) and spread *kauri* dieback.

Figure 16: Quote (from an anonymous respondent) re limits to involvement in, and the effectiveness of the myrtle rust programme (Myrtle Rust data).

*Kaitiaki* were also forthcoming in listing ideas around the opportunities for them and their communities to be more involved in biosecurity incursions, and what capability and capacity they had to be involved in incursion responses (Figure 17). The bulk of them noted, however, that their and their community's ability to participate were hampered significantly by resourcing and time.

Opportunities are huge. *Maori* could be leading surveillance and responses given they are on the land. *Maori* also have knowledge that can help guide responses and tool development. A great example is the response to the *Bonamia* incursion in Foveau Strait where MPI's response time was hampered by time and vessel routes that had to go around *wahi tapu* areas. Work between the response team and local *mana whenua* meant they removed the *rahui* from the area the vessel needed to go to speed up the response, meaning the eradication of the bacteria could happen faster. *Mana whenua* have the ability to lift *rahui*, to work around RMA issues etc if they are engaged in the response from the outset.

Figure 17: Quote (from an anonymous respondent) re opportunities for *kaitiaki* and their communities in response to biosecurity incursions (Myrtle Rust data).

### 4.3.3 Recommendations

Based on the survey interview data we have collected since 2017, we would recommend that:

- *Māori* and *kaitiaki* are aware of biosecurity and specifically myrtle rust but are not being engaged. A database should be created of *kaitiaki* who can receive up to date information on the response and developments.
- Active *kaitiaki* are in the bush at least once a month and are ideal for monitoring myrtle rust spread.
- *Kaitiaki* want above all else to protect their environments for their *whānau*, and they want to be involved in planning pest control if possible. Engagement in discussions with *kaitiaki* and *hapū* will determine how they can be better engaged in the myrtle rust response and other biosecurity responses.
- *Māori* have capability and infrastructure that can help in biosecurity responses, but they need resourcing to engage effectively. Engagement also needs to be pre-incursion response, so that trust-based relationships are built.
- *Kaitiaki* are looking for information and tools that can assist them to make better decisions.

- Any tools developed that require the use of toxins or aerial spraying need to be designed with Māori, and or include Māori in discussions prior to their use. Otherwise users and developers of the tools risk losing their cultural and social licence.
- Influencers or trusted partners should be used when trying to engage with Māori, *kaitiaki*, *iwi*, *hapū*. Trusted partners and influencers could be scientists with relationships, *iwi*, *hapū*, community leaders, or the Ministry of the Environment. Make sure you understand that these influencers and trusted partners vary across the regions and age gaps i.e. kaumatua and kuia.

## 4.4 Maps and protection plans

### 4.4.1 Protection plan – overview

The Protection Plans aim to support and influence hapu/iwi ability to respond to biosecurity risks on taonga species and link with activity and resources within the biosecurity response and embed in the national biosecurity system and in long-term local and regional management planning to manage biosecurity incursions. The Plans are dynamic and would be utilised to also inform cooperative approaches in future incursions.

This research applied a novel approach to the development of protection plan's in response to myrtle rust that enabled Māori communities to consider the impact of myrtle rust on their taonga and cultural sites of significance and the reparation and actions that can be taken to protect their taonga.

The plan guides Māori whanau, hapu iwi and their communities through a process that reconciles plans with a 'desired end state' which they have identified for their taonga, recognizing and defining the protection and preservation of their taonga including cultural sites of significance.

### 4.4.2 Capacity and capability

Hapu, whanau and iwi have varying capability and capacity to develop and implement biosecurity management plans. Though there is strong capability and capacity amongst hapu and iwi environmental resource units, understandings about 'biosecurity' and the 'biosecurity' system, in some instances, required translation. Though biosecurity is a part of mana whenua kaitiakitanga, Te Tira Whakamataki is cognisant that the term 'biosecurity' is unrelatable for many of our whanau and the adoption of a 'biosecurity lens', which focusses on the disease or pathogen is incongruent with a matauranga Maori approach to planning for an incursion such as myrtle rust.

SwampFrog Consultants were selected for their expertise in rongoā, pest management, horticulture and environmental health monitoring and were tasked with articulating biosecurity to whanau to inform the development of plans to address myrtle rust. Working with a number of Māori from Waikato and Whanganui, SwampFrog Consultants developed initial protection plan's that informed this report.

Objective of plans

The development of the protection plans were designed to get Māori<sup>11</sup> thinking about taonga that need protection from myrtle rust and other potential plant pathogens. The development of the plan was designed to enable communities to identify taonga species and sites of significance and importance to them. In the development of the plans, whanau Maori were encouraged to share narrative and information determining the importance and significance of their taonga and both traditional and contemporary approaches and methodologies to responding to myrtle rust.

The planning considered long-term protection of significant biodiversity and short-term and long-term needs relative to the protection and preservation of specific taonga or sites of significance, which included roopu capability and capacity to develop and operationalise protection plans. As part of the development of the plan, whanau Maori defined their 'desired end state' and working with SwampFrog Consultants populated a response framework which included; timelines, activities, tasks and resources that would be included in their protection plans.

<sup>11</sup> Māori in this report refers to *iwi*, *hapū* and *whānau*.



### 4.4.3 Plan development

Five protection plans were completed from **Waikato region** (Port of Waikato region), the wider **Te Awa Tupua** catchment (Whanganui region), **Whaatapaka** Marae (Manuka Harbour), **Ngāti Tarāwhai** (Te Arawa) and **Tau Iho I Te Po Trust** (Ngatirua, Whangaroa). An additional two rūpū are also preparing to develop plans in July. Letters noting their involvement are attached to the report (appendix one).

The plans developed by the rūpū, were underpinned by the need to consider the impact of myrtle rust on taonga and sites of significance. Advised by science and authorities, the rūpū developed plans on the premise that all impacts of myrtle rust will have adverse effect on taonga species and sites of significance. Future plans should also consider that the impact of incursions may be beneficial to the taonga or sites and, recognising that this may be adverse or beneficial and both may need to be considered objectively.

The plans were developed (intentionally) in isolation of agencies or other communities. The plans will inform the development of regional biosecurity response plans and strategic decisions with decision makers. Where hapu and iwi have existing or emergent Environmental Management Plans, policies for biosecurity and specifically response to myrtle rust will be adopted into their policies. This will enable the plans to be given effect with regional councils and crown agencies.

The information for the plans is underpinned by the whanau and hapu matauranga Maori and narrative, and rūpū expressed their concern at having this culturally sensitive information being publicly disclosed. In order to address this limitation, this project ensured that the traditional skills and knowledge of its Māori partners was protected via an agreed IP Plan that was consistent with statements and declarations on the protection of Indigenous Intellectual Property.<sup>12</sup> A key component to the IP Plan is that all information that is collected or offered from mana whenua is deemed to be their exclusive Intellectual Property and use of that information by contractors requires free and prior consent from the individual from whom the information originated or from their named mātauranga Māori Custodian.

Additionally, a Data Management Plan was developed to ensure we had participants free and informed consent prior to the research beginning and established an agreement for the use of the research data. Information given to participants around the development of protection plans recognise the provenance of the IP, states the purpose and intended use of collected information, and agrees on the parameters for the availability of information collected inclusive of its potential uses and communication of the research, via project reports and project presentations that are internal to the research project and the research organisations that it is affiliated to, in this case Plant & Food Research, Scion Research & MPI. However, reports, presentations, communications and publications that are external to those organisations along with new/subsequent funding and research applications **will** require further discussions with participants or their representatives, and written consent (see appendix two). Information from the plans that is deemed sensitive has already been redacted.

Though the framework used by SwampFrog Consultants is prescriptive, protection plans should be dynamic and allow for both contemporary and established thinking. The plans articulate the rūpū value of their taonga and/or site and why it is significant to them. Te Tira Whakamataki is cognisant that all taonga including whenua and tangata (land, sea, water, air and people) are of equitable importance in a Maori context. That inter-generational relationships which links whanau and hapu with their tupuna and whakapapa (previous generations) and their respective histories are captured or anchored in specific taonga species or sites and may be of more significance to individuals, whanau or hapu across multiple regions. The rūpū considered many of these factors and in their plans articulated a clear statement of the significance of their taonga and/or site, and in this expression was able to understand the complexity and impact of myrtle rust, informing the development of their plans.

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<sup>12</sup> Including the Declaration of Belem, 1988; Kari-Oca Declaration and Indigenous Peoples Earth Charter, 1992 & 2002; Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples, 1993; Julayinbul Statement on Indigenous Property Rights, 1993; Santa Crua de la Sierra Statement on Intellectual Property, 1994; Tambunan Statement on the Protection and Conservation of Indigenous Knowledge, 1995; Suva Statement on Indigenous Peoples Knowledge and Intellectual Property Rights, 1995; the Kimberley Declaration, 2002 and the United Nations Declaration on the Right of Indigenous Peoples, 2007



Significantly, the roopu did not consider 'public benefit' in the development of their plans as the 'taonga and site' were centric to their decisions for protecting and minimising risk from myrtle rust. The roopu initial enquiry considered the impact on whanau and whenua and the effect of the loss of taonga species on their cultural practice and values and their way of life. Roopu were implicit that any change that affects their identified taonga and sites should be managed by Maori and that there is benefit in investment in building hapu kaitiaki capability to respond to myrtle rust and to inform ongoing regional plans which have implications for their taonga and sites at risk of infection from myrtle rust.

#### **4.4.4 What is in a Protection Plan**

A protection plan is informed by the following:

- What is the taonga and site of significance at risk from and why is it important to whanau, hapu and/or iwi.
- How will the protection plan change, protect or prevent the risk of myrtle rust (the biosecurity incursion) to our taonga and/or site of significance and/or whanau, hapu, iwi (people).
- How can the affects of myrtle rust be prevented, eradicated, mitigated and/or compensated.

Key to the success of any of the protection plans is hapu and iwi access to information about the incursion. This includes information and science about myrtle rust and also operational information and data about the spread of myrtle rust and its current known impacts. SwampFrog provided the information about myrtle rust to the roopu participants. Continued updates during the development of the plans from Plant and Food, were also considered in the development of (some) of the plans. Establishing the 'desired state' was the first step in the plan development and informed the decisions that were critical for the roopu in their plans. These included discussing cultural approaches that may work to manage the risk of myrtle rust and identifying people and agencies that would partner in their plans.

The initial scoping of the plans was completed by SwampFrog and the roopu. With the absence of a consultant, a scoping exercise led by hapu and/or iwi would work with councils, agencies and community would establish the parameters for their protection plans. Future scoping report could include what is being done and by who and why, when its being done and what are the expected outputs and outcomes that are in place or emergent that enable the protection of taonga and sites of significance from myrtle rust. In addition a maramataka would be developed that includes the activities of the stakeholders and the community and would be incorporated into the protection plan.

Roopu articulated in their plans the description of their sites of significance that they want to protect from myrtle rust. The narrative from this part of the plan formed the discussions relevant to the 'current state' of taonga and sites. In most of the plans roopu premised that the 'current state' at the implementation of the plans and through monitoring taonga and sites after the adoption of the plans over time, would be the 'desired state'. To be useful and relevant, through monitoring and observations of taonga and sites, the plans need to have agility and be responsive to the impacts of myrtle rust. Information gathered as a result of the focus of the plans would inform any potential plan changes or further developments. Summaries of the conditions of taonga and sites would be compared with the narratives provided describing the 'desired state'. Both cultural approaches (cultural indicators, inter-generational observation's, rahui), contemporary planning and environmental auditing methodologies and technology (gis data, photo's) can contribute to the ongoing development of roopu protection plans. The information gathered by the implementation and operationalisation of the protection plan establish mini-research areas and flags critical impacts which may include the risk from vectors, hot-spots for myrtle rust presentation, changes in land use, increases in seasonal tourism, increased forestry or industry activity and amendments to local government or national policies.

#### **4.4.5 Matauranga Maori, information and data**

To enable the effectivity of protection plans, information that inform its development must be comprehensive. Roopu collated their narrative's relevant to the taonga and sites that were the focus of the protection plans and Swampfrog provided the information in most instances on the ecology of myrtaceae. Continued communication amongst roopu with their whanau, kaumatua and tohunga will continue to generate information relevant to the protection plans, and the plans should consider that collection and collation of data and information and its historical development should continue to be

fully understood and synthesised into any plan developments as they will identify and convey the impact on taonga and sites.

Data collection and the way in which information is being collected and stored and managed should be given consideration. In addition to data and information collection, hapu and iwi would discuss which part of their historical inventories that would or could be included to inform the development of the plans. Determining referencing which is underpinned by common-sense and systematic consistent processes would enable quick and efficient acquisition of data and information that would be used pre and post plan development. Though data and information efficiency was not a consideration in the development of plans, roopu articulated that their information was highly important and of significant value to them. More work will be considered to enable further characterisation of their information and inform further development of their plans. Efficiency of protection plans could also then be enabled by 'what if' scenarios within the protection plans allowing for an iterative process, feeding back into the ongoing plan design process.

#### **4.4.6 Policy and management frameworks**

Though the protection plan development focused on the cultural context and information, policy that can be adopted into existing hapu and iwi environmental management plans should be tested against existing regional policy frameworks and crown agreements/arrangements. Financial resourcing and contributions could influence decisions which enable or disable the protection plans and the communication and agreements informed by the protection plans should provide clarity where there is perceived complexities. As the plans are whanau, hapu and iwi centric and reliant on full engagement with kaitiaki and rangatira, protecting taonga and cultural sites of significance are given status in any of the arrangements with councils, crown agencies, communities and/or stakeholders that are affected by the protection plans.

#### **4.4.7 Prevent, eradicate, mitigated and/or compensate**

The protection plans aim to make every reasonable effort to prevent, eradicate or minimise the adverse impact of a myrtle rust incursion on hapu and iwi taonga species and designated sites of significance. There will be challenges where councils and particularly crown agencies decisions are more weighted to 'public benefit', which will at times may conflict with the intent of hapu/iwi protection plans. Embedding policy in council processes and engaging with crown agencies like the Department of Conservation, are crucial to the successful implementation and operationalisation of the plans.

Roopu informed the following work to enable the development of the protection plans which contain the following or variations of the information from engagement by SwampFrog Consultants and Te Tira Whakamataki.

- Ko wai au – the roopu, their geological location, their connection to that land or place through their whakapapa, the values that underpin their work and roles.
- Condition of the taonga and site of significance collated at the time of the plan development
- The value of the taonga and the site (to the roopu and their whanau and hapu)
- Detail about how myrtle rust will impact their taonga and site
- The groups and people to be engaged in the development of the plan

Specifically Roopu considered the following issues

- Identifying a taonga or site of cultural significance to them (referred to as taonga in this report),
- Articulating the significance of the taonga and why it should be protected,
- Defining a desired end state for the taonga,
- Noting the traditional uses of the taonga,
- Stating the issues at hand for the taonga,
- Conducting an ecological assessment or stocktake of the taonga and surrounding areas,
- Noting information related directly to the issues at hand and ecological assessment, and
- Identifying support needed from others to protect the taonga long-term.

In addition, the development of plans should also include:

- A maramataka both ecological and process centric, including deadlines for activities within the community or region that impact the protection of taonga and sites from myrtle rust infection.

- Agreement on data and information control, collation and curation
- Policy and process development that embed the protection mechanisms within the plan with local government and crown agencies.

#### 4.4.8 Draft protection plans – results

The following draft protection plan was then taken through a peer review process with Māori researchers at Plant and Food Research, and Te Tira Whakamātaki staff and *kaitiaki*. The final protection plans were completed in collaboration with Māori communities

The quantity of data in the protection plans makes it difficult to summarise results in a table. Copies of the five protection plans are attached in appendix three for closer examination.

**Table 1: Protection Plans by area, region and developer**

Protection Plan	Rōpū	Region / Area	Developer
1	Te Taniwha o te Awa Waikato (Te Puuaha)	Port of Waikato, Waikato region	SwampFrog
2	Te Awa Tupua	Wider Whanganui Catchment (Lismore Whānau Farm block, Atene, & Hiruharama)	SwampFrog
3	Whaatapaka Marae Whānau	Lot 6D Parish of Karaka, Manukau Harbour	SwampFrog
4	Tau Iho I Te Po Trust (Ngatirua)	Ngatirua rohe potae, Whangaroa Harbour	TTW
5	Ngāti Tarāwhai Iwi Trust	Te Arawa (Lake Okataina)	TTW

#### 4.4.9 Identifying a taonga of cultural site of significance.

The **regions** covered in the protection plans are identified on the maps below. They cover a range of regions from Northland down to Whanganui, all of which have myrtle rust in the area, if not on the site. Accordingly, these plans are timely for that reason.

Each site has been identified and is **significant** for a variety of reasons including; a site of cultural significance, a site of cultural practice, a *mahinga kai*, *maara kai* (food gathering) site, a resource harvesting site (e.g. fencing, housing, hangi materials), a *wananga* site, site of recreation, *urupā* (cemeteries) or *marae* (traditional meeting house), and or a site with significant *rakau* (trees) on it.

As expected, mana whenua who have been engaged in developing these protection plans have been unable to single out one specific priority for their site that needs protection. They have also been reluctant to identify specific trees of significance for a number of reasons including their fear that the tree will be identified and targeted and they may giving the tree status, lose their taonga, and concern that selecting a specific taonga will result in the protection only extended to one tree and not the whole site.

## Plan 1 – Te Taniwha o te Awa Waikato, Te Puuaha (Port of Waikato region)



Picture 1: Te Taniwha o te Awa (Te Puuaha), Port of Waikato region

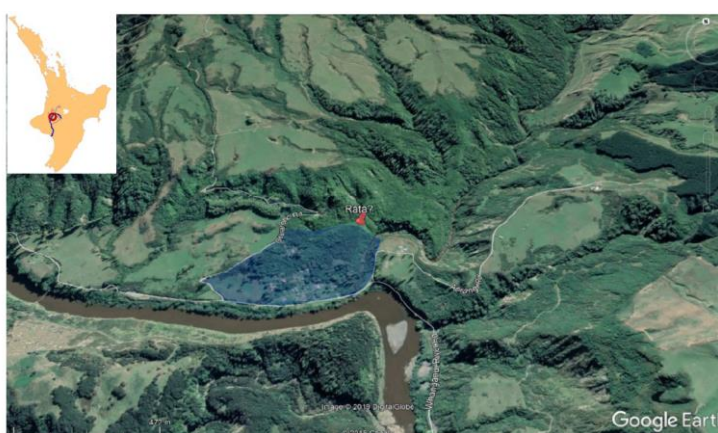
## Plan 2 – Te Awa Tupua (Whanganui region)



Picture 2: Lismore Forest site, Whanganui region



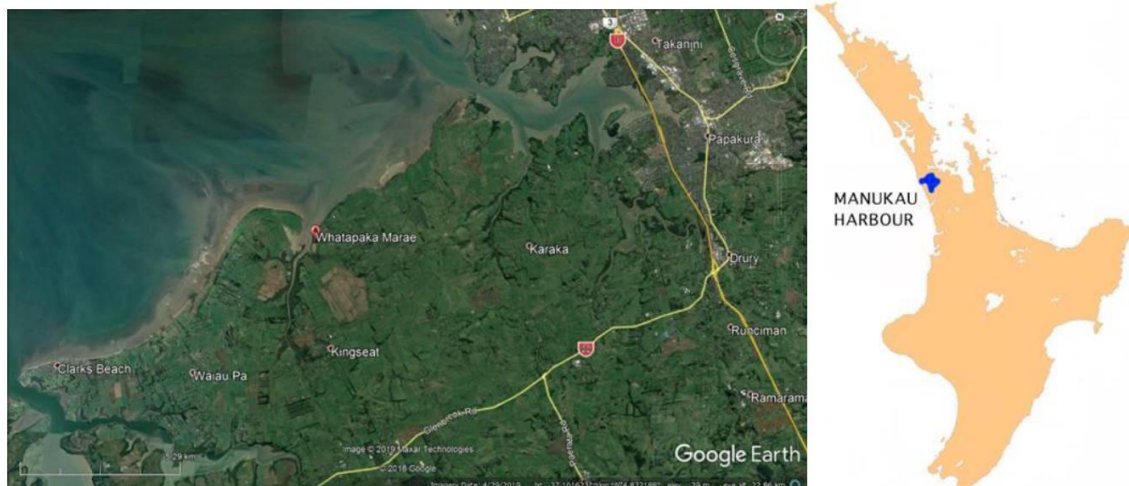
Picture 3: Ātene, Whanganui region.



Picture 4: Hiruharama, Whanganui region

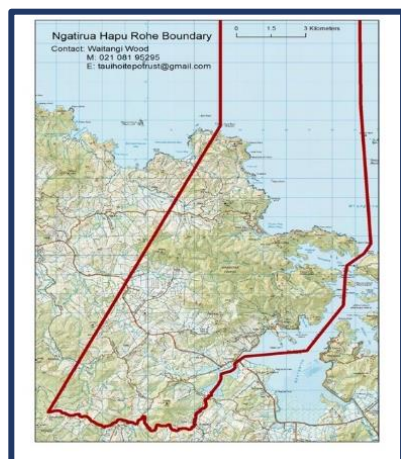


### Plan 3 – Whaatapaka Marae Whānau (Manukau Harbour region)



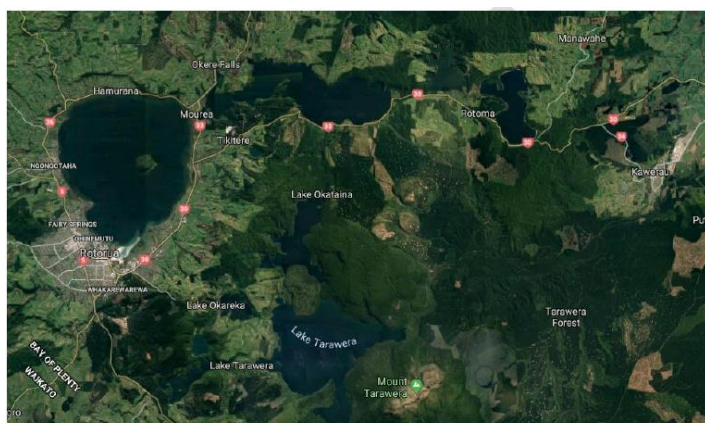
Picture 5: Whaatapaka Marae Whānau, Manukau Harbour region

### Plan 4 – Tau Iho I Te Po Trust, Ngatirua (Whangaroa region)



Picture 6: Ngatirua, Whangaroa region

### Plan 5 – Ngāti Tarāwhai (Rotorua region)



Picture 7: Areas of significance to Ngāti Tarāwhai



Figure 2: Ngāti Tarāwhai rohe.

#### 4.4.10 Significance of the taonga, and why it should be protected

Our **observations about the taonga (sites and specimens of significance) identified** provided the narrative about the significance of taonga to the respective hapu/iwi. The inter-generational connection and relationship with taonga, their lands and with each other, interwoven with the way they view themselves and their identity as respective hapu and whanau.

#### 4.4.11 Articulating the significance of the taonga and why it should be protected

Observations also articulated the significance of taonga that enabled the care of whanau and hapu, enabling their cultural obligation, connection of their status to other tribes and regions, and edification of their role to ensure protection of their taonga for current and future generations

#### 4.4.12 Defining a desired end state for the taonga

There is an implicit understanding that all things natural, exist within their own harmony and have natural order and balance. The introduction of myrtle rust incursion creates an imbalance to the natural biodiversity of these sites. The plans sought to address the disharmony created by the incursion and work towards returning the site or taonga back to its desired state. Cognisant of the relationship between taonga and tangata (people), and that the impacts are cumulative, the plans provide varied responses that consider the unique context of the people and their relationship with their land and taonga. The plans informed discussion amongst participants and their whanau about the desired state of their taonga and culminated in conversations about the plan addressing other issues in their response to myrtle rust. In addition, communication and shared common understanding about the desired state, between Maori and the communities and agencies they were working with, was considered as key to the plans success.

#### 4.4.13 Noting the traditional uses of the taonga

Typical **cultural uses or practices** of the taonga identified included; cultural sites of significance, sacred sites, sites that are the basis of historical narrative that determined authority and/or connection between people and places, sites that were specific to traditional practices such as harvesting food and medicine or resources for traditional arts such as weaving and carvings. The connection to these taonga and their use is centric to the identity of the hapu and iwi. Without experience and exposure to taonga, hapu have experienced the loss of their language, traditional values and practices and history. The ability to continue the traditions and cultural practices is essential to taonga *tuku iho* (inter-generational sharing of knowledge and practices) and the inability for exposure and experience of our taonga and their associated histories will result in the demise of our culture and the extinction of Maori people. The expressed concern resonated in the development of the plans, that if we do not act the loss of taonga will result in the loss of our cultural uses and/or practices.

#### 4.4.14 Stating the issues at hand for the taonga

In the biosecurity system, the introduced incursion has that status and attention in the response. The plans highlighted the emphasis on taonga having status and giving the significance of that taonga the status as opposed to making decisions based on 'public benefit'. Though cognisant that to protect our taonga, sound knowledge of myrtle rust is imperative, the importance of managing the risk posed by myrtle rust to taonga was Management of the myrtle rust doesn't take into account the taonga, but rather the disease in/on the taonga, without significant status. The Roopu plans give voice to taonga and elevate their status in decisions that inform management plans, strategies and policies that they are central to.

#### 4.4.15 Conducting an ecological assessment or stocktake of the taonga and surrounding areas

Mapping whats on site – assumption mana whenua have familiarity of taonga and whats on site, in place there are varying degrees of understanding. Ecological assessment may need support in some places – highlights capability gaps (inequality) – ecologically, culturally. Cultural narrative will require support as its important to ecological assessment to give baseline data for monitoring. i.e. pre-Cook whakaaro – memories and trust and confidence to get that down without misappropriation of info.

#### 4.4.16 Noting information related directly to the issues at hand and ecological assessment

Engagement with science – knowledge gaps especially around new diseases. How to access information about disease, how it behaves, vectors, removal etc. Also access to other ecological information for wider sites needs

Communication – plans not only about site and its ecological needs, a primary issue is the transmission of knowledge, risk etc.

Decision-making – how do we make decisions using best information

#### 4.4.17 Key implementation factors needing consideration are resourcing and capability

As above and below

#### 4.4.18 Issues impacting the ability of Māori to effectively practice their kaitiakitanga

On the one hand Māori can always be kaitiaki and can practice it.

Non-Māori need to recognise and empower Māori to be kaitiaki

Investment and section 4 prevent Māori being kaitiaki – councils and doc have resourcing to be kaitiaki but that's not distributed to Māori who are kaitiaki.

#### 4.4.19 Identifying support needed from others to protect the taonga long-term

Technology support to get data down

#### 4.4.20 Recommendations

Based on the protection plans we have developed to date, we note and or recommend the following:

- Sites chosen for protection were chosen for a large number of reasons, predominately though because as a whole site/system they had cultural significance to mana whenua. Of less importance was particular trees or stands of trees. Getting information on particular trees of significance will be difficult as mana whenua seem reluctant to; 1) have those identified, and 2) separate them from the wider ecosystem of the site.

### 4.5 Mātauranga-Māori Hui

Using examples and lessons learnt from the existing model in responding to the current Myrtle Rust incursion, the objective was to explore Māori expectations that encouraged the inclusion of mātauranga solutions in this and future responses.

Initially, these discussions were scheduled to be the basis of hui with tangata Māori. However, in considering the spread of myrtle rust and the varied views amongst kaitiaki, we realised that kanohi-ki-te-kanohi (face to face) interviews utilising existing relationships of known knowledge holders were more appropriate to acquire the appropriate information from their whanau/hapu. Cognizant that kaitiaki will be more inclined to share their knowledge in a more intimate setting with people they know and trust, we considered respondents would be more forthcoming with their opinions, as opposed to publicly sharing their views in an open forum. We also felt that this series of engagements were more conducive to encouraging open relationships and gathering honest and frank narratives and perspectives that enable mātauranga solutions.

With that in mind, we asked kaitiaki and whanau:

1. When and or where has 'science' benefited kaitiakitanga and rangatiratanga in the response to a biosecurity incursion/issue and or myrtle rust specifically?

## Responses

- Don't know
  - Good question
  - In terms of protecting and utilising the environment that iwi and hapu has interest in through commercial and marine development, understanding that certain restrictions are put in place because of a biosecurity incursion and a quarantine is in place, for example, for three months. This is consistent with kaitiakitanga.
  - Used correctly, science is important in dealing with the invasive species.
  - When science has worked with iwi in kaitiakitanga, it has worked e.g. Ngatihine, Landcare Research, Department of Conservation and the local community.
  - Science has enabled kaitiaki to learn and understand the new biosecurity incursions, like myrtle rust on a national level.
  - Kauri Dieback Healthy Trees Healthy Future research programme (led by Scion) example - shared science and mātauranga solutions. The teachings from that programme could have application to the Myrtle rust programme.
  - We have worked with NIWA to increase the number of tuna in our local awa; however, this scientific approach is improved by working science with mātauranga Māori. Local remedies to treat kauri dieback have also seen science-based and mātauranga-based research to find effective remedies.
  - Unsure
  - Some western science mixed with our mātauranga Māori helps with modern problems.
  - Western science or knowledge is never a benefit to kaitiakitanga. Both knowledge systems ought to work in harmony rather than the arrogance of one or the other. Knowledge by measurement has its place alongside mātauranga Māori, no longer over mātauranga Māori and whakaaro Māori.
  - Science is important to our kaitiaki as it provides information about the introduced species. In addition to the science, we need to invest in relationships with indigenous peoples who are intimate with these exotic species and learn from indigenous peoples. Scientists have also been more receptive to engaging with hapu and recognising their cultural authority over taonga, working with them to support the recognising the implications of emergent technology for which tangata Māori do not have an appetite.
  - Given the incursion a name
  - The last hui I was part of science was there was still a gap between science and mātauranga. I think once there are some base data gathered and shared there may be a shift; however, I am concerned that science will always stand independent of traditional mātauranga and we will never truly understand the impacts of biosecurity incursions, only understand half the situation. If we look to centre our indigenous knowledge and complement this understanding with science, we might have a chance to understand the behaviours of new incursions and how they might be managed.
  - Rena oil spill; Whale rescue
  - Recently
  - Education on how it spreads
2. How can or has science contributed to the needs of kaitiaki and rangatira in the biosecurity and wider environmental space?

## Responses

- Do not know
- Can provide facts but should not substitute, disregard or disrespect mātauranga
- It can contribute to the needs of iwi and hapu by fully engaging with them to implement their environmental objectives, including fully funding iwi and hapu science scholarships, biosecurity courses or programmes and fully fund resource management units.



- Not sure what the question is asking
  - Provide information
  - Some tests/sampling/tools we can use alongside our kaitiaki monitoring
  - Not enough; however, that is changing. In the past we and our tikanga, our kawa were researched as “lab rats”, or dismissed as irrelevant, but now there is a more informed approach that has research undertaken by or with tangata whenua.
  - Unsure, but I suppose it would help in hapu and communities analyse data
  - Use mātauranga Māori
  - Western imperialism commenced the massive problem; therefore, western science alone has little to contribute, except mass slaughter of pests and native creatures and finally nature.
  - Identifying pests; identifying possible solutions
  - Partnering, re-distribution of science budgets and resources, provide information to hapu and kaitiaki about invasive species, would also like to recognise National Science Challenge: Biological Heritage for their focus on mātauranga Māori within their prioritisation, shifting the importance of cultural licence.
  - Science has given some explanation to how an incursion has arrived, where it came from and what it looks like. Science could give effect and weight to mātauranga Māori with thousands of years of historical knowledge in the environmental space. I believe Māori have a lot to offer to science but do not believe it is given the respect it deserves.
  - I am suspicious that traditional indigenous knowledge is still not being taken seriously. Until science acknowledges indigenous knowledge as equal, there will always be tensions in how biosecurity incursions are managed.
  - Kauri dieback, whitebait, ecology, sand dunes, pipi monitoring
  - Contributes to understanding the impacts of biosecurity incursions
  - Sharing of knowledge and data collection
3. How do we support and protect Māori who have and want to use mātauranga Māori solutions to eradicate/manage foreign species or disease, but may not want to share their solutions with non-Māori scientists or organisations?

## Responses

- True collaboration
- I support this, knowledge is power, and its protection of intellectual property could be used against Māori instead and restrict Māori from finding solutions to foreign invaders or outbreaks etc.
- This is not a one sentence answer. Briefly there needs to be trust. Trust is only acquired through building long-term relationships. Generalising, science want to be paid for their science and their discoveries, and Māori look to benefits for future generations (kaitiakitanga) which is in my mind sustainability.
- In whatever way we can, financially, resources, etc.
- Strict IP controls that adhere to UNDRIP and other relevant indigenous conventions
- Support and encourage funding of mātauranga research, with tolerance and patience in the research outcomes. The more we do, the better we will get. Readiness to accept other paradigms of knowledge, other than western science, but open to indigenous knowledge, the faster solutions might be found. The first step is recognition of mātauranga Māori solutions at national and local government level, and knowing that mātauranga Māori should sit alongside science and that those aspects are complementary.
- Have trust that Māori have solutions
- Listen, understand, and talk with us. Don't tell us what to do anymore.
- Assist with the protection of intellectual property. Result-based funding. Assistance with funding research and development. Funding trials
- Intellectual Property. Protection Education in the field of science. Funding
- Invest in strategic trust relationships with hapu/Iwi who will take care of their own.

- IP must be protected. Mataatua agreement as a starting point. Provide scientific training in a Māori format i.e. in a setting that is familiar, not foreign, to the Māori way of life. This way Māori science and western science could elevate a greater knowledge base. There are probable synergies with Māori science and western science but possibly presented differently.
- Resource iwi, hapu or Māori lead research organisations. The solutions are for Aotearoa not the rest of the planet. Our knowledge, our traditions, our medicines, are only relevant here. If mātauranga has answers, it should not matter that Māori hold the knowledge; it will still benefit the nation.
- Funding and workshops
- Enabling Māori by providing resources and support
- Regular hui and training opportunities for different kaitiaki groups to meet up and wānanga
- Don't know

#### 4.5.1 Results

Scientists from Plant & Food Research and Scion collated the information collected from hui workshops, and listed these in the following categories:

- A. Research Needs
- B. Management of Disease
- C. Surveillance Management
- D. Implementation MPI Communication
- E. Generic Biosecurity 2025
- F. Other Themes.

The hui informed the development of a surveillance sheet and a method for removing a small outbreak of myrtle rust. Although these resources and methods were useful to hapu/iwi engaged in the workshops, the messages from hapu/iwi were consistent. These were:

- Resource be assigned to hapu/iwi to manage a response in their region
- Direct access to the scientists that know the incursion so that they can have real-time current and accurate information
- Information, about where it is and where it is being notified
- Tools and approaches that do not compromise cultural integrity
- That agencies and others work toward eradication of exotic species and diseases.

Drawing on public health models, and the responses from the myrtle rust hui, the following Huarahi (pathways) centric to Māori values were developed to evaluate/test the effectiveness of the engagement within the myrtle rust research project, and also to provide a guide for future engagements with hapu/iwi in research projects (Table 4).

Huarahi recognise that relationships and values underpin the success of any engagement. In addition to this, a shared kaupapa (task) inclusive of shared outcomes provides a foundation for open communication and a sharing of emergent understandings. Huarahi firstly articulate how hapu/iwi can be engaged by scientists and agencies, and secondly provide an evaluative tool for the cultural effectiveness of the engagement. Huarahi utilise eight Māori values and reconcile them with the relationships that may influence and inform the kaitiaki and rangatira of hapu/iwi, and their ability to manage a response to a biosecurity disease and/or incursion, or to engage in scientific and research projects.

Table 4			
Kaupapa	Kokiri – Whakatara - Tautoko		
Tikanga	Whanau Me Whenua	Whakawhanaungatanga	He Tangata
PONO			
Transparency and social responsibility	Whanau demonstrate accountability for the integrity of their environment	Whanau and hapu accountability is informed by waananga and consultation	Valid representation is determined
Scientists engaged in the project understood the importance of ensuring the information available to workshop participants was current and accurate, including the whakapapa of myrtle rust.	Hapu/iwi that participated in the workshop through their articulation were able to demonstrate the concern and love they had for their taonga species. There were confronting moments where hui participants were advised about the extinction of species overseas, and the taonga it will affect in New Zealand. They expressed a concern for the lack of information and resourcing to inform people about myrtle rust and some frustration and their appreciation of the information that they received about myrtle rust and also about the activity in the myrtle rust response.	The information conveyed with hui participants was provided from only the scientists' context. There are growing concerns from kaitiaki and rangatira that the way in which information is widely transmitted re-writes our own cultural narrative. Hapu encouraged scientists to share information, and so minimise the spread of myrtle rust from infected sites to other hapu through people movement.	An MPI representative accompanied the scientists and engaged and responded to Māori workshop participants on issues outside the immediate project. MPI were honest about the project being finite and although the work from the hui will inform future long-term planning for a response, that there was no established plan to resource kaitiaki to manage myrtle rust.  This discussion was also supported by the Team, who were clear about the parameters of the workshops and the intent/purpose of the project.
MATAURANGA			
Mātauranga enhances the cultural, social and economic value of hapu	Whanau have the opportunity to share traditional and cultural knowledge	Whanau and hapu support mātauranga acquisition - Empowered and informed whanau and hapu	Promotes and edifies mātauranga Māori
Mātauranga knowledge and approaches were encouraged as part of the workshops.	Scientists in the workshops were sensitive to discussion that introduced mātauranga Māori solutions. Māori hui participants were particularly interested in the pathogen and 'assessing trends through time'. They were concerned with whole 'ecosystem collapse' and reiterated that the role for science is to provide whanau/hapu and their communities with intelligence on myrtle rust and access to current information.	Māori hui participants expressed concern that although there was an intent by the project team to engage Māori, that there are many Māori that did not or could not attend.	In the hui, scientists edified the value of mātauranga Māori and the willingness to share their science so that a better understanding of myrtle rust by Māori would enable the application of mātauranga solutions. Scientists who are engaging in cultural authority arrangements with hapu also emphasised their willingness to work within the cultural parameters advised by mana whenua where any emergent solutions and/or approaches utilise mātauranga Māori.
AROHA			
Opportunities for inclusion	Full participation of whanau is encouraged	Relationships are strengthened and exist generationally  Innovation and creativity exists and is encouraged	Māori and individual approaches are acknowledged and integrated
The Team focused on inviting participants that were from the areas affected by myrtle rust.	The invitation to hui were issued through various environmental networks, including Te Tira whakamataki. Individual notifications of the hui were advised to respective whanau and kaitiaki from the areas	Recognising that it would be challenging for participants to attend the hui at the three identified sites, the Team made available a Skype link which supported those who were unable	The intent of the Team was to engage kanohi ki te kanohi with those whanau and hapu who were engaged or had a working operational knowledge of the myrtle rust response. They

Table 4			
Kaupapa	Kokiri – Whakatara - Tautoko		
Tikanga	Whanau Me Whenua	Whakawhanaungatanga	He Tangata
	<p>where the hui were held.</p>	<p>to attend in person, allowing them the opportunity to present their views and hear the presentations from the Team, including information about myrtle rust and the project.</p> <p>This also provided opportunity for mana whenua and kaitiaki from different rohe to share their support and solutions with each other going forward.</p>	<p>discussed the importance of being resourced to manage the incursions in their regions, including the ability to build capability of whanau/hapu into long-term management. This posed some real challenges for the Team, who were often confused with operational MPI staff and MPI (the agency). So often whanau and rangatira expressed their need for activity and resourcing that the Team was not in a position to provide. The Team agreed to return and report the developments of the Project and to maintain communication with kaitiaki who were interested in emergent information about myrtle rust. This 'promise' to report back on the monitoring tool they produced, and to provide an update on information about the myrtle rust incursion and response, was fulfilled with a second and final round of hui.</p>
WHENUA			
Transparency, responsibility and authority	Whanau demonstrate kaitiakitanga of their whenua	Whakapapa and relationships to the land is acknowledged and edified	Authority is determined (giving effect to cultural authority)
<p>In the response to myrtle rust, hapu representatives have been frustrated at their engagement. Although MPI have directly engaged with them in most instances, and kept them informed of their progress, hapu have not influenced any of the decisions made in their rohe. This has influenced the Team engagement, as whanau, hapu participants believed the scientists to be MPI.</p>	<p>To varying degrees, hapu/iwi who have been introduced to myrtle rust are concerned about possible extinction of their taonga. Frustration has also arisen from the acquisition of taonga seed and plant material from agency-managed forests and sites, without cultural agreements acknowledging provenance, providing a clear purpose and without having sought permission. Notably, although the Team sought to engage with hapu/iwi in the areas where myrtle rust was most established, few whanau and with the exception of kaitiaki or hapu/iwi environmental managers who were directly engaged in the response (because of intervention from Te Tira Whakamataki), i.e. Taranaki and Ngati Rehia (Kerikeri) few tangata Māori attended. In addition, although myrtle rust had been in their region for some time, neither community nor tangata Māori had much knowledge of the pathogen.</p>	<p>Hapu/iwi representatives at the hui, expressed their fear that their inability to manage the spread or eradication of myrtle rust will result in the spread to other regions. It was generally felt that better and current information should be made available throughout the respective regions.</p>	<p>The timeframes were challenging in establishing the first round of hui. Hapu/iwi were engaged as participants, not as co-facilitators of the hui. In all instances in the first round, there was little recognition of the cultural authority except where the Team recognised the mana whenua of the rohe where the meeting was being held as a cultural courtesy. Where the Team could, we advised hapu/iwi that the workshops were being held in their rohe. Permission was not sought from hapu/iwi, with the exception of Ngati Rehia (Kerikeri), to have the hui in their rohe.</p> <p>This has been an acceptable approach to date by people and agencies consulting with tangata Māori and communities. Hui were held in venues provided by Plant &amp; Food Research, for convenience. This unintentionally placed the</p>

Table 4			
Kaupapa	Kokiri – Whakatara - Tautoko		
Tikanga	Whanau Me Whenua	Whakawhanaungatanga	He Tangata
	<p>Hui attendees were keen to support the Team to develop tools and methodologies that would support their kaitiaki of their taonga and information about where myrtle rust was being found was shared with them.</p> <p>During the workshops, tangata Māori expressed the need to have good and current information to enable their ability to plan their response (eradication) of myrtle rust, including slowing spread.</p>		<p>kaupapa under the auspice of the Team presenting, and removing the 'ownership' of the kaupapa, <i>'to develop tools and methodologies to respond to myrtle rust'</i> from a Te Ao Māori to a non-Māori paradigm, changing the context of the engagement.</p>
MANAAKI			
To protect, provide and contribute	Supportive and safe environments exist for whanau	Hapu determine opportunities which promote tangata Māori development	Safe and healthy environments exist which support engagement
<p>Timelines influenced the ability of tangata Māori to be involved in the development of the tools and methodologies project. Recognising this, the Team encouraged the contribution of tangata Māori through online communication and information sharing.</p>	<p>Although the hui venues were not marae, Te Ao Māori team leads ensured that tikanga was adhered through the course of the workshops. Whanau and kaitiaki who attended felt that their views were heard, valued and incorporated into the workshop responses. The environment provided space for their views and those of their community.</p>	<p>Hapu were not part of the design or facilitation of the workshops. Although kaitiaki and whanau engaged in the workshops, hapu/iwi were advised about the hui, and invited to the workshops. In a Te Tiriti paradigm, hapu would provide 'permission' to have the workshops about their taonga in their area. This engagement evolution would indicate the recognition of cultural authority of hapu/iwi of their taonga, and demonstrate the willingness of other New Zealanders to 'do things differently' acknowledging the role that hapu/iwi have of kaitiaki and rangatira of their taonga.</p>	<p>Having the workshops at community centres and Plant &amp; Food Research sites encouraged community and agencies to participate. This provided a space for shared values and cultural centric views, and the opportunity for peoples (participants) to discuss and reiterate those things that resonated with both tangata Māori and other New Zealanders. The sites also provided a degree of security to the Team presenting the workshops and to the Project and Agency representatives.</p>
RANGATIRATANGA			
Acknowledges te Ao Māori	Recognising hapu and whanau connection, and marae as a place for whanau	Intergenerational reconnections are created and recognised	Collaborative approaches are developed that recognise and support kaitiakitanga and rangatiratanga
<p>The Project Team through the Te Ao theme acknowledged the role kaitiaki and rangatira have in any biosecurity response. In focusing the workshops on the areas most affected (at the time), they presented their enquiry to hapu/iwi in their rohe, providing opportunity for whanau and hapu to</p>	<p>Because of the short time frame, kaitiaki and recipients of the invitation were not fully able to encourage stronger participation by whanau, and those tangata Māori who were able to participate and attended the hui broadly represented views and presented solutions and narrative from their regions.</p>	<p>In each of the regions where the workshops were held, with the exception of Te Puke, the hapu/iwi most affected in the region were represented at the hui. Kaitiaki who had been directly engaging with MPI in the response were able to share both their frustration but also potential solutions from a hapu/iwi perspective. The distinction between the role of mana whenua and tangata</p>	<p>The Project Team was considered in their approach to ensuring that kaitiaki and rangatira were engaged in the work. Scientists addressed issues that were raised about how to deal with a small break-out of myrtle rust and a monitoring tool, to support future monitoring; and observations have been made available to hapu as a result of this Project. The incorporation of cultural indicators</p>

Table 4			
Kaupapa	Kokiri – Whakatara - Tautoko		
Tikanga	Whanau Me Whenua	Whakawhanaungatanga	He Tangata
attend and inform the development of tools and methodologies to manage/eradicate myrtle rust.		whenua was clearly articulated in the discussions and in feedback to the Team. In addition, hapu were able to talk about, and share with other workshop participants, the work that they were doing to address myrtle rust and the relationships they had established inclusive of both enabling and disabling, in their response to myrtle rust.	<p>in the monitoring tool has been an ongoing discussion for the scientists as they grapple with demonstrating that the tools being developed have considered and amalgamated the tangata Māori views and approaches.</p> <p>In addition to the lead myrtle rust scientists attending the hui and workshops, MPI sent their representative to address issues about the response that were outside the parameters of the Project brief.</p> <p>It is notable that the venue, for the hui and workshops, were familiar locations, as places of employment for some of the Team. This choice of venue reiterated that the discussion was a science conversation and information-gathering exercise, as opposed to a Crown Research Institute and hapu/iwi engagement. Again this was informed by timeframes and also an accepted norm for 'consulting' with hapu/iwi and whanau Māori.</p>
TAUTOKO			
Enabling collaboration	Whanau support the development of the hapu (expression of vulnerability and understanding)	Strategic trust relationships are encouraged and informed	Respect for the diversity of (hapu) culture, knowledge systems, values and approaches exist
This was an example where direct collaboration was introduced by scientists (and also MPI). This is a good starting point, but the degree of collaboration required to recognise the Te Tiriti Partnership needs to consider that authority of hapu, and engage early in how they want to contribute or lead engagements of this nature. The team encouraged tangata Māori participants to inform the development of their work, and adhered to their promise to support hapu/iwi where they indicated they wanted	Not enough time was provided for the degree of engagement with whanau. The kaitiaki who attended, in retrospect, did need a kanohi ki te kanohi engagement to establish the relationship and understanding about the work. It would have been challenging for kaitiaki and hapu to engage their whanau in the discussion, as it was a new project and they attended to 'suss out' what it was. For future engagements, support by way of information and pre-engagement will enable better engagement with whanau and support kaitiaki to take the lead on the engagement in their respective rohe.	Hapu were consistent that they want to be resourced and supported to address any biosecurity response in their area. They have established relationships with DoC and Councils and many hapu/iwi hold or have held environmental contracts or arrangements. Most have established capability but are challenged meeting the capacity requirements and where there is a lack of capability, hapu environmental resource managers and kaitiaki support each other with information and their networks and increasingly, hapu/iwi are establishing resource management units to progress the care and protection with their taonga and natural biodiversity.	The Team worked during the workshops and hui and also in the work in producing the reports and monitoring tool to respect the distinctions between regions. These discussions included consideration of hapu and their respective relationships, established and emergent, with MPI, DoC, Council, organisations and community. Although mātauranga was broached, the science about myrtle rust and the willingness of Plant & Food Research and Scion to engage mana whenua in ongoing myrtle rust and other biosecurity research, where there is capability, were reiterated through the course of the hui.

Table 4			
Kaupapa	Kokiri – Whakatara - Tautoko		
Tikanga	Whanau Me Whenua	Whakawhanaungatanga	He Tangata
direct engagement.			
TIKA			
Establishing rules of engagement; Seeking justice	Respect of mauri, tapu me noa	Respect for one another and acknowledgement of whakapapa	Marae-based interaction
This engagement deviated from the business-as-usual consultation.	The Team sought to engage with hapu most affected by myrtle rust (face to face). Their engagement was restricted by time frames and shaped by previous experience in consulting with tangata Māori. In this instance, although there was a cognisance that engagement with the Te Tiriti partner would have stronger attention in building individual relationships, the process of consultation that was adopted was consulting with tangata whenua as opposed to engaging with mana whenua. In contrast to this, hapu representatives who attended engaged with the Team as hapu/lwi mana whenua.	The Team acknowledged hapu/iwi who have cultural authority in the respective rohe they attended. In future engagements (as discussed earlier), science project Teams need to engage earlier, and consider co-design and co-facilitation of these hui and meetings that inform decisions, tools and methodologies that underpin the protection of taonga.	The Team are encouraged to have future interactions and engagements on marae.

## 5 Risks, issues and lessons captured

There were a number of risks and issues that arose throughout the project that were unforeseen at the proposal stage and even during the planning discussions. Hui fatigue was the result of the same individuals and groups being constantly approached to attend and contribute at hui. There is a need for continuity so the Team are not having to readdress topics and areas already covered in previous hui; however, there are not many kaitiaki able to constantly respond to requests to attend and contribute to hui. Basically, there is not a huge pool of people with an interest, understanding or with the skills or knowledge to contribute to the kaupapa (topic). Other reasons for a lack of enthusiasm were:

- Many are not compensated for their time. It cost people time and money to attend
- Differing levels of knowledge, interest and understanding of biosecurity and/or the diseases impacting the ngāhere (native estate)
- Not meeting their or their people's needs
- No resource available to support initiatives.

A declining interest in myrtle rust was apparent through declining attendance at hui, brought about by reduced coverage in the media of myrtle rust and the shift by MPI to Long Term Management (LTM) in the response continuum. Comments and feedback received by the Team at hui and during the survey and interview process have indicated that there is not the same urgency in responding to myrtle rust as there first was, so there is no need to “get worked up” about it. Other comments encountered were:

- “It is here to stay” (Anonymous, Te Taitokerau)
- “There is no way of controlling it, so we just need to live with it” (Anonymous, Taranaki)
- “Oh, I thought it had gone away” (Anonymous – Waikato)

The declining interest experienced by the Team over the course of the project prompted the need to refine the methodology of the way information was garnered from the knowledge holders of mātauranga. Coupled to this was the understanding that not many would share this information in an open forum.

However, a number of concurrent initiatives that were engaging Māori researchers, kaitiaki and knowledge holders, such as Biosecurity 2025 and development of the Myrtle Rust Science Plan, identified myrtle rust-related research priorities that were informed by the same mātauranga-based kaupapa we undertook in this project. The following research priorities for future co-development to enable and unlock mātauranga-based research pertinent to the long-term management of myrtle rust in New Zealand were identified:

- Undertake research using Kaupapa Māori methodologies that have potential to protect and restore the mauri and hau ora of Myrtaceae ecosystems
- Development of novel, socially acceptable myrtle rust mitigation technologies, including rongoā Māori-based tools
- Development of a mātauranga-based surveillance framework for the ongoing detection and monitoring of myrtle rust in New Zealand
- Evaluating long-term cultural impacts of myrtle rust on taonga species and ecosystems.



## 6 Discussion

### 6.1 Engagement

This research project was focused on the theme of Te Ao Māori. The stated outcome is: Greater understanding of Te Ao Māori implications of myrtle rust, to support more effective investments, and improved use of Mātauranga, specific Māori knowledge, and kaupapa Māori approaches in management regimes.

A number of hui and conversations, through interviews, surveys and protection plan discussions, were conducted during the course of the project. A number of concerns that require consideration were raised during these interactions. A mistake we have quite often made at past hui is making it all about ourselves! The team understood this and were willing to make concessions to our objectives to achieve the following:

- Strong robust relationships built on integrity and trust
- Open and honest conversations (Mana Whenua able to tell us what is wrong with the system, agencies and ourselves)
- An in-depth understanding of what their needs, wants and desires are as kaitiaki and Mana Whenua.

Although this did not directly address the original objectives to support more effective investments, and improved use of Mātauranga, specific Māori knowledge, and kaupapa Māori approaches in management regimes, it did lay the foundation for building solid relationships and future engagement in key locations and key groups and individuals around the motu.

There are three key themes that constantly emerged throughout the course of the project. It will be important that they are addressed, to build on our relationships and demonstrate a willingness to work together to achieve common outcomes. The common themes are:

- The need to be part of the conversation and to be kept informed on all aspects of any response
- The need to receive relevant training, to be able to manage, as kaitiaki, their native resource and taonga
- The need for adequate resourcing to support kaitiaki
- Reciprocity is two-way. For us to gain access to more sensitive knowledge and information, we must first demonstrate our commitment to the relationship. The best way we can to that is with time and resource.

### 6.2 Findings about the myrtle rust response

An issue raised during the hui and interviews was that while the Coordinated Incident Management System (CIMS) (Figure 27 used by MPI to respond when there is an outbreak was effective in mobilising agency staff and managing the incursion response, it can be counter-intuitive, as it focuses on the agency response mechanisms and not on the social and cultural implications for Māori. This can be unsettling for Māori involved in a response, as this does not acknowledge or recognise the importance of taonga, and there is no clear pathway for Māori inclusion or participation. This is what is critically missing from CIMS, and while iwi are mentioned within the Welfare function, mechanisms for partnering throughout the response structure do not seem to be appropriate. The word Māori does not come up in any of the streams, and there is no part for the kaitiaki role of tangata Māori, even though MPI have acknowledged it should be part of the response. An example of the lack of inclusion of Māori is there is nothing in CIMS about whose role it is to engage with and seek permission/approval from mana whenua in an incursion. Although this is done by MPI at some stage during the incursion response, because it is not part of a defined role, there is no consistency in when this occurs or the degree of engagement. When engagement occurs late in a response, there is often nothing that can be done to address cultural breaches, and this damages relationships and trust with affected hapū. Furthermore, much of the onus falls on the person in charge of the response and their level of comfort when engaging mana whenua. A change needs to occur in the CIMS to include Māori, to have them a part of every future response, and to define roles and timing for engagement. Having Māori appropriately incorporated into the CIMS response would have them seated at the decision-making table where they should be – ko tātou.



**Figure 27: Diagram of the generic Coordinated Incident Management System (CIMS) adapted by the Ministry for Primary Industries during an incursion response.**

The CIMS distanced Crown agents, who had the most control in managing the incursion, from the people (hapū) that were and are still are most affected. This has been expressed by hapū who have 'actively' engaged with MPI in their response to myrtle rust. 'Controllers' and MPI staff, notified of the presentation of myrtle rust, descended upon regions and establishing control centres as well as collecting and moving plant material, without cognisance of hapū boundaries or authorities and without consideration or concern for rangatira and/or kaitiaki. Mana whenua were relegated to 'Joe Public', and they viewed the perceived efficiency of MPI in dismay, as groups like AsureQuality, 'partnering' with MPI, assumed authority over the response and in turn over the kaitiaki of their taonga.

To address the escalating notified outbreaks of myrtle rust, MPI increased their workforce by seconding staff from DoC and councils. When their resources were exhausted and to support the remnant response, MPI substituted their response workforce with local people, secured through employment agencies such as Workforce, who provide temporary unqualified labour. This was actioned without hesitation or consideration for the resourced engagement of kaitiaki, most intimate with their regional community relationships and networks, and affected taonga. When it was determined within the response that nothing further could be done and no further resource would be invested in the local response, MPI and its operational staff left the region, while the bemused and frustrated kaitiaki and rangatira of that place were left to engage with the remaining MPI staff who had no authority to make any decisions that enabled hapu/iwi ability to manage any part of a response to protect taonga in their rohe. This sometimes entrenched indifference of authorised staff working within Crown agencies is perceived by Māori as a failing as a Crown agent and of their obligation to recognise Te Tiriti and take direction and/or recognise mana whenua: hapū.

While the CIMS model provides a structure for Crown agency staff to work within a designated response, the best gains for cultural partnership have come from outside or peripheral to MPI's response. Biosecurity Strategy 2025 (BS 2025) recognised the need to establish relationships with Māori and the importance of hapū/iwi kaitiaki having capability to manage biosecurity incursions in their respective regions. Informed by a meeting with Taranaki iwi, MPI, working with Te Tira Whakamātaki, initiated and implemented training for kaitiaki from across the affected myrtle rust regions to learn about and identify myrtle rust. This discreet work, for the most part unrecognised, is one of the few actions taken by MPI that recognised their Te Tiriti obligation. It was ground-breaking.

Feedback from hui and interviews reveal that hapū/iwi continue to seek information, training and resourcing to manage the emergent outbreaks of myrtle rust in their regions. Organisations such as the Biological Heritage National Science Challenge, and Te Tira Whakamātaki, and hapū working with lead scientists from Plant & Food Research and Scion have, outside the Response system, been the most successful in informing Māori communities and engaging them in the development of potential tools and methodologies that may support them to address small or emergent outbreaks of myrtle rust in their regions.

In July 2018, informed by the spread of myrtle rust across New Zealand and establishing in new regions infecting a range of new hosts, MPI engaged Scion, Manaaki Whenua Landcare and Plant & Food Research to conduct scientific research on improved myrtle rust surveillance tools and approaches for long-term management of this pathogen. Part of this research included developing cost-effective diagnostic and surveillance tools to enable surveillance in different rohe, as the pathogen establishes in new areas. Hui were scheduled in New Plymouth, Te Puke and Kerikeri, the most affected areas. The hui were to gather insights and understandings from people involved in various aspects of the surveillance and to develop tools to support early detection of myrtle rust and the long-term impacts of the disease. The hui encouraged kaitiaki and whānau to engage.

## 7 End user impact

This project has highlighted the need to engage Māori from the outset rather than at differing stages throughout any incursion response. Being involved in all aspects enabled whānau the opportunity to contribute to the various pieces of work and be kept up to date with all developments. This was born out from the following feedback received from kaitiaki who attended the hui and workshops

### **Hayden Henry: (Tauranga Moana)**

It is good that there has been engagement, but it is the same as other times that hapu have engaged in the agencies' processes. Tauranga iwi engaged in the training and worked with AsureQuality and MPI staff in the early stages of the response, and although there were indications that the trained people would be resourced to be on the ground and the regional response, nothing has come of it. Hapu/iwi remain diligent but have been disappointed by the lack of follow-through by MPI. Having the scientists coming out and providing first-hand information about myrtle rust was really useful, but not enough time was given to the whānau for them to be able to attend. Also, the workshop was good, but we are not really sure what is happening next.

### **Gavin Smith: (Tauranga Moana)**

It's great that the scientists that know about myrtle rust came and talked to our whānau. More would have been encouraged to come if the hui had been at a marae. The workshops were really interesting and it was encouraging to see whānau working and discussing issues and solutions with community and agencies (DoC and Councils). There was a great deal of confusion initially about who the scientists were and the difference between them and MPI (which was addressed at the hui).

### **Robyn Tauroa (Whangaroa, Ngati Rehia Hui)**

The hui was interesting and it would be really useful to keep the dialogue going between kaitiaki, hapu/iwi and scientists. When we arrived at the hui, there was many people who were not just the scientists, but came with the scientists. Also, at the hui, the scientists presenting needed to be prepared to give handouts for those attendees, and what would have been really useful was a brief with profiles and the project which was handed out at the beginning of the project, not the end. It was a little confusing if you were not involved in the workshop. Also, there were no next steps, and I think whānau expected there to be. I think the method to manage a small myrtle rust outbreak would be useful for hapu, and also the monitoring tool to add to the monitoring being done by whānau and kaitiaki. It is a little frustrating that this has been done in isolation of a long-term plan in which hapu and kaitiaki can be engaged and resourced.

## **Fern Brand (Taranaki)**

It was really good to see the scientists come out and talk with the whanau and community. More of this should occur. The workshop was a really good way to hear others' perspectives. We were unable to attend the second hui. It would have been useful if we could have planned those hui together. We would like to have gotten people there, but the second hui was in the middle of a great deal of regional activity, which made it difficult to attend. Currently, hapu/iwi are looking for consistency in those that want to engage with us, so having further hui, where we are also involved in the coordination, would be useful, especially as we develop plans for long-term management.

## **8 Recommendations**

This research project was focused on the theme of Te Ao Māori. The stated outcome is: Greater understanding of Te Ao Māori implications of myrtle rust, to support more effective investments, and improved use of Mātauranga, specific Māori knowledge, and kaupapa Māori approaches in management regimes.

The priority topics for this theme are: Identify Māori values and species specific aspirations for managing myrtle rust, to inform management options and identify opportunities for Māori involvement. This is a critical input to short- and long-term management. The research was broken down into six different objectives, with Objective 6 containing a final report.

The objectives as stated in the project plan are:

1. The Contractor meets with MPI and Myrtle Rust Project Leads, for each research themes, to ensure Myrtle Rust Project alignment.
2. Regional Hui - to identify priority taonga sites, species and specimens for surveillance and protection
3. Surveys and Interviews with Māori - to test Māori views of myrtle rust and its impacts
4. Maps and Protection Plans - to map and prioritise taonga Myrtaceae and support them to develop self-management protection plans for these taonga
5. Mātauranga-Māori Hui - to discuss and identify potential mātauranga-based tools, solutions and practices for eradicating/managing myrtle rust for the long term
6. Final report and Presentations - detail all work performed and overall findings from the Te Ao Māori Theme.

A number of hui and conversations, interviews, surveys and protection plan discussions have been conducted during the course of the project. Emerging from these conversations have been some areas of concern. These concerns needed to be addressed before we can move on to our kaupapa. A mistake we have quite often made at past hui is making it all about ourselves! The Team understood this and were willing to make concessions to our objectives, to achieve the following:

- Strong robust relationships built on integrity and trust
- Open and honest conversations (Mana Whenua able to tell us what is wrong with the system, agencies and ourselves)
- An in-depth understanding of what their needs, wants and desires are as kaitiaki and Mana Whenua.

Although this did not directly address the original objectives to support more effective investments, and improved use of Mātauranga, specific Māori knowledge, and kaupapa Māori approaches in management regimes, it did lay the foundation for building solid relationships and future engagement in key locations and key groups and individuals around the motu.

There are three key themes that constantly emerged throughout the course of the project. It will be important that they are addressed, to build on our relationships and demonstrate a willingness to work together to achieve common outcomes. The common themes are:

- The need to be part of the conversation and to be kept informed on all aspects of any response
- The need to receive relevant training, to be able to manage, as kaitiaki, their native resources and taonga
- The need for adequate resourcing to support kaitiaki.

Reciprocity is two-way. For us to gain access to more sensitive knowledge and information, we need to first demonstrate our commitment to the relationship. The best way we can do that is with time and resource.

## 9 List of Appendices

### 9.1 Appendix 1. Hui summaries

#### Project # 1

##### **Building engagement and social licence: Andrea Grant**

- Review of existing knowledge
- Co-inquiry process engaging stakeholders & communities (surveys and focus group meetings)
- Learning case studies to ascertain i) risk perception ii) key networks and groups for targeted engagement iii) relative impact and management options in different areas

##### **Te Ao Māori: Alby Marsh**

- Develop a greater understanding of the implications of myrtle rust (post border and long-term) on and for Te Ao Māori; What is the impact of the disease on local taonga?
- Support Māori to develop their own myrtle rust management plans for each rohe
- The identification of specific-Mātauranga tools, Māori-led solutions and practices for local elimination and or managing myrtle rust

##### **Improving management tool & approaches: Beccy Ganley**

- Improved myrtle rust surveillance
- Mapping Myrtaceae distributions
- Pilot trials of management tools
- Scoping a resistance breeding programme

##### **Evaluation of impacts and responses: Beccy Ganley**

- Development of indicators for environmental, economic and socio-cultural systems to evaluate consequences of myrtle rust in New Zealand
- Scope potential environmental and economic consequences of myrtle rust in New Zealand using a modelling framework

#### Project # 2

##### **Understanding the pathogen, hosts, and environmental influences: Grant Smith**

- Testing of native and important exotic host species susceptibility against the pandemic *Austropuccinia psidii* strain in Australia (Queensland)
- Risk assessment of New Zealand Myrtaceae against other *A. psidii* strains (testing in Uruguay and South Africa)
- Epidemiology of myrtle rust in New Zealand conditions
- Identification of genetic markers linked to resistance
- Determine the role of New Zealand Myrtaceae endophyte communities against myrtle rust

##### **Update and achievements**

- Four hui were conducted in conjunction with Themes 1 and 3 at Taranaki (Ngamotu), Waiariki (Te Puke) and Te Taitokerau (Kerikeri) and Te Tairāwhiti (Te Araroa). The purposes of the hui were to:
  - update organisations and individuals of the Myrtle Rust Programme
  - introduce the various pieces of work being done in each theme
  - workshop the **causal factors** for myrtle rust.

## **Hui summaries**

### **Hui 1 – Taranaki**

A small intimate group with three very strong iwi representatives in attendance. A key concern for them were some of the historic stands of pōhutukawa in the rohe under threat from the rapidly spreading myrtle rust disease. Their angst was on what to do should they become infected. A difficult decision for them will be to weigh up the pros and cons of using a chemical fungicide to reduce the impact and spread if the issue were to happen. With Taranaki being a myrtle rust hotspot, there was a great deal of interest in mitigation and surveillance tools and some of the breeding/genetic work being considered.

#### **Attendees**

- Mana Whenua – 3
- Central Government – 3
- Local Government – 1
- CRIs – 1
- Business owners – 2
- Project team – 6

### **Hui 2 – Waiariki**

Representatives from central and local government, CRIs, industry and mana whenua attended this hui at PFR in Te Puke. A better than expected turnout and a good cross-section of attendees, with some travelling from Wellington to be there. Some really good conversations ensued, with many appreciative of the work being presented; however, a word of caution was proffered by a mana whenua representative: “do not rest on your laurels, and keep communicating” especially with the results of the new and exciting work being undertaken.

#### **Attendees**

- Mana Whenua – 2
- Video Link – 3 (Mana Whenua)
- Central Government – 3
- Local Government – 2
- CRIs – 5
- Business owners – 1
- Biosecurity organisations – 3
- Project team – 6

### **Hui 3 – Te Taitokerau**

This hui had a strong mana whenua presence brought about by their early involvement in the response to the initial myrtle rust discovery. For some, the hui was reinforcement that positive outcomes were being sought in response to the disease. Providing guidance on a safe process for removing infected plants and the equipment required to do so was one such example; as was the pictorial material of a range of Myrtaceae and the varying appearance of infection.

There is a desire to develop a management plan for the rohe and some of the work being undertaken in the Myrtle Rust programme will assist in providing material for the plan.

#### **Attendees**

- Mana Whenua – 12
- Video Link – 3
- Central Government – 1
- Local Government – 1
- Project team – 6

### **Hui 4 – Te Tairāwhiti**

There was a strong turn out by the team involved in the wider Myrtle Rust programme. From the lessons we have gained from previous hui, our aim was to provide an overview of the myrtle rust disease, the impact it is having on Myrtaceae, especially native varieties, and highlight to the hui the work that was being undertaken in the programme. This was in keeping with the theme “that you only know what you know”. This extra information would assist in increasing their overall myrtle rust knowledge.

Information was provided about the response and latest research findings, including distribution of myrtle rust in New Zealand and research programme summaries in verbal and written material.

Because of time constraints brought on by the need for people to travel and catch flights, there was not a great deal of time for discussion, planning or mapping of priorities for the rohe. The intention was to have a second planning hui to discuss a strategy and co-develop a set of priorities that met the needs of mana whenua.

However, during the brief discussion we did manage to have, kaumatua outlined a number of points including:

- Their concerns around the speed with which the myrtle rust response was transferred to long-term management after it was found in Te Araroa
- That there should be opportunities to look after the interests of iwi e.g., mānuka honey
- That iwi should have been involved at the start of the myrtle rust response
- That many large landowners will not allow DoC staff on their land
- Proposed involvement in a pilot project (Pukeauru Reserve)
- Note that MPI had research funding for \$4.5 million, but not for a local community-led research work
- Succession planning for the younger generation, including some involvement in science, to become scientists
- Increasing the awareness and capability of biosecurity
- Opportunities for collaboration (e.g., fishing at feet)
- Desire for an inclusive approach going forward i.e., tatou not matou.

Following the hui, a group of locals invited some of the team to the site of a very significant taonga for the iwi. Te Waha o Rerekohu is the name of this taonga. A pōhutukawa estimated to be over 600 years old, and said to be one of the largest in New Zealand. There was a great deal of concern expressed by the locals about the unknown: not knowing whether it is infected; how to monitor for infection; and what to do if it does become infected. The team were able to refer to the work currently underway in the programme and how the tools being developed may be able to assist them in answering their questions.

#### Attendees

Mana Whenua – 12  
Central Government – 1  
CRIs – 7  
Project team – 3

### Hui 5 – Te Tau Ihu

Two hui were organised in Te Tau Ihu for Monday 11 March 2019.

Grant Smith and Alby Marsh (PFR) were invited to present to the Te Tau Ihu Fisheries forum, a collective of iwi representatives from the top of the South Island, in a joint presentation with Paula Loader (MPI) on the work they have undertaken in the MPI-funded Myrtle Rust programme, with an emphasis on solutions developed in the programme.

An in-depth overview was provided by Paula Loader on the myrtle rust journey, from its origins in South America around the world to where it is today. Paula also gave an insight into the response and research activities MPI is either involved in or supporting.

Grant Smith and Alby Marsh gave brief accounts of the research programmes they lead, and left resources to further assist the group to understand the impact the disease is having and activities they can undertake to help to mitigate the impact of myrtle rust.

#### Attendees

Mana Whenua – 8  
Central Government – 2  
Project team – 2

### Hui 6 – Te Tau Ihu

The second hui was for a wider audience of interested people and groups. Invitations were sent to representatives from central and local government, mana whenua, researchers and environmental groups. This hui was held in the evening of Monday 11 March.

Unfortunately it was not well attended, with only two people external to the project team being present. However, the positive was that the two attendees were very well connected with iwi in the “top of the South” and were very engaged with the kaupapa.

The material developed in the project was well received, with the comment that the pictorial material of the plants, diseases and the maps will assist kaitiaki to identify the plants and disease in the ngāhere, and serve as a reminder that some very iconic species could be at risk. A suggestion was made that the team should try to make contact with the environmental arm of each iwi, or collectives like mana whenua ki Mohua to engage them in the kaupapa. This will be an ongoing relationship that will transition into the next phase with the MBIE-funded Beyond Myrtle Rust (BMR) project.

#### Attendees

Mana Whenua – 1  
CRI –1  
Project team – 5

### Hui 7 – Te Tai Tokerau

Originally there were two hui planned: A late morning hui at Kohewhata Marae, Kaikohe, to be followed by an evening hui at Takau Marae, Takau, north of Kerikeri.

Unfortunately, the Kohewhata hui did not eventuate, as a number of the team flying in that morning were not able to land at Kerikeri airport because of adverse weather conditions.

The Takau Marae hui was very well attended, with a mix of mana whenua and interested locals in attendance. There were also a couple of attendees from the cancelled hui in Kaikohe in attendance.

An overview of the project was provided to the hui, detailing the four themes of 18607 and project 18608, all of which was captured in an interim report. The report was distributed among the attendees to further analyse and comment upon.

A key discussion area was resourcing - providing support for mana whenua to undertake their own surveillance and monitoring; information and data that could become valuable in the ongoing mapping of the disease.

Other funding avenues were suggested in which support could be provided to those technicians wanting to undertake this work stream. Follow-up contact was suggested when the application process came on line.

#### Attendees

Mana Whenua – 8  
Interested locals - 5  
Central Government – 2  
Project team – 9



Takau Marae Hui. Te Tai Tokerau.

### Hui 8 – Waiairiki

The second in the follow-up series of hui.

This hui followed the format of the first, with an overview provided of the progress made and outputs produced in the programme. Again, a copy of the interim report was distributed to attendees.

Although not as well attended as the first, there were some very interesting conversations that ensued. Much of it centred on the ethical dilemma faced by some councils when deciding how to deal with individuals who do not want infected plants on their property removed.



#### Attendees

Mana Whenua – 1  
Local Government – 3  
CRIs - 3  
Central Government – 2  
Project team – 8



Te Puke Hui, Wairiki.

#### Hui 9 - Taranaki

Not a well-attended hui, with only one person external to the group attending. The individual had extensive experience in the initial myrtle rust response, being part of the AsureQuality team in both Te Tai Tokerau and Taranaki. He was very keen to maintain involvement in the ongoing long-term management of the disease. The team was keen to utilise his skill set, if able to do so in future.

#### Attendees

Interested local - 1  
Central Government – 2  
Project team – 5

#### Information presented at the two Te Tau Ihu hui and the three follow-up hui

- An interim progress report
- A map showing the myrtle rust distribution over the whole country
- A map specific to each rohe showing the distribution in more detail
- A step by step pictorial guide to how to remove a myrtle rust-infected plant
- A list of relevant agency and Māori representatives and contact details
- Pictorial material of native Myrtaceae species

## 9.2 Appendix 2. IP Plan & Data Management Plan

### IP Plan

Information that is collected or offered from mana whenua is deemed to be their exclusive Intellectual Property and use of that information by contractors requires free and prior consent from the individual from whom the information originates or their named Mātauranga Custodian.

### Data Management Plan

Ensure participants' free and informed consent prior to the research beginning.

Information form attached to the front end of the survey states the purpose and intended use of collected information, noting that there will be no identifying information used.

The IP and Data Management Plans allow for project reports and project presentations that are internal to the research project and the research organisations to which it is affiliated, in this case MPI, Scion and Plant & Food Research. Reports, presentations, communications and publications that are external to those organisations, along with new/subsequent funding and research applications, will require further consent or discussions with participants or their representatives (see Appendix 4).

Information by contractors requires free and prior consent from the individual from whom the information originates or their named Mātauranga Custodian.

Additionally, a Data Management Plan was developed to ensure we had participants' free and informed consent prior to the research beginning and a plan in place for the use of the research data.

## 9.3 Appendix 3. Protection Plan – Letters

To be added.

## 9.4 Appendix 4. Protection Plan Template

### [NAME SITE/SPECIMEN] PROTECTION PLAN for [NAME ORGANISATION]

#### 1.0 VISION STATEMENT

(Desired end state)

<b>VISION</b> <i>e.g. To protect the whakapapa of Ngaati Rangima</i>
---

#### 2.0 MISSION

(Mission to be completed)

#### STATEMENT

Key outcome	Targeted Beneficiary	Problem	Action
<i>To protect and enhance [our relationship with]</i>	<i>mānuka and its habitat</i>	<i>from myrtle rust</i>	<i>in accordance with mātauranga and the best available science</i>

#### 3.0 VALUES & PRINCIPLES

The Values and Principles that will guide this Plan include:

- **Whakapapa**  
*[e.g. Whanaungatanga is the foundation of the relationship between Ngaati Rangima and our natural taonga. It also encompasses our relationships to surrounding hapu and marae whanau.]*
- **Kaitiaki**  
*[e.g. Ngaati Rangima are the hereditary kaitiaki of the natural taonga in our rohe.]*
- **Manaakitanga**  
*[e.g. Ngaati Rangima will continue to manaaki the hapu and marae whanau in our rohe by enabling them to access mānuka from our rohe in accordance with the tikanga of the hapu.]*
- **Rangatiratanga**  
*[e.g. Ngaati Rangima retain the right to make decisions about all aspects of care and protection of the natural taonga in our rohe.]*

- **Mahitahi**

*[e.g. Ngaati Rangima will collaborate with individuals and/or entities to protect our natural taonga.]*

#### **4.0 PROTECTION OF INTELLECTUAL PROPERTY**

#### **5.0 SIGNIFICANCE OF TAONGA TO [name of organisation]**

*[All natural taonga are of significance to Ngaati Rangima. Through our long association with our taonga a body of knowledge – mātauranga – has been established that underpins our cultural practice, use, tikanga and management of the resource. Ensuring our ongoing relationship with our taonga will enable the hapu to retain and pass on our cultural practices and mātauranga to current and future generations.]*

##### **Taonga to be protected**

The purpose of this Protection Plan (the Plan) is to identify and implement processes and procedures to identify and protect our [mānuka and its habitat] from the ravages of myrtle rust.

*[The mānuka had and is still used for a range of purposes. The utility of the tree provides health and practical benefits.*

*Ngaati Rangima are very fortunate that our kaumatua had the foresight to retain the block of land with the mānuka stand intact rather than clear it for farming activities as has been done with adjoining landholdings. Korero with the kaumatua has revealed that this decision was deliberate to ensure that the hapu would still be able to access and use mānuka as our people have always done and to protect several significant sites that are also located on the block.*

*Their foresight has ensured that not only Ngaati Rangima benefit but that we are also able to share the resource with related hapu and marae whanau who through historical loss of land (i.e. Raupatu), or unauthorised land clearances by leasees, no longer have access to a source of mānuka.]*

#### **6.0 TRADITIONAL USES OF [name taonga MAANUKA]**

##### **6.1 Brooms**

*[Mānuka brooms are still used on the marae and in whanau kaauta.*

*Before each annual Koroneihana held at Turangawaewae Marae the rōpū responsible for the cleaning of the marae and sports grounds travel to mānuka stands to source branches to make their brooms. They are part of the unseen workforce that ensures that manaakitanga afforded during the hui is maintained and in turn the mana of the people, the marae and kingitanga is upheld.*

*In the still of the early hours of the morning the sound of the mānuka brooms can be heard echoing across the marae. Even if you can't see the sweepers, the brushing sounds of the mānuka signals that they are there, ensuring that the marae are immaculate for the following day's activities.*

*The mānuka is more than a tool; it is an integral part of ensuring manaakitanga is upheld. It is a sound that has echoed down the years.]*

##### **6.2 Fencing**

*[Our marae have retained their preference to retain mānuka fencing around our marae.*

*The mānuka and site that we wish to protect is not just for the purpose of Ngaati Rangima. When required, mānuka is also harvested for fencing of marae within the wider region.]*

##### **6.3 Hangi**

*Mānuka has always been the wood of choice for hangi. All the marae within the rohe also prefer the use of mānuka and are able to source mānuka from our site.*

##### **6.4 Poles for Kaka**

*[The whitebait fishery is a traditional fishery of Ngaati Rangima. Whanau still fish at sites that have been handed down to them through the generations and will be handed down to future generations.*

*The mānuka is used as a pole for kaka (fishing nets). The poles are also part of the inheritance of whanau along with the fishing sites. While the net will require replacement at times, the poles are usually retained and passed on to the next generation of fishers.*

*They are chosen for their strength and weight. Waahine poles are chosen for their durability and lightness, while the poles for the Taane tend to have a wider girth and are weightier, as their nets tend to be bigger.]*

## **7.0 OTHER MATTERS OF SIGNIFICANCE WITHIN THE SITE**

### **7.1 Walking Tracks**

*[The old walking tracks of our tupuna are still visible and protected within this block. They are not visible because of the mānuka; however, Ngaati Rangima have endeavoured to maintain them as a reminder of the tracks that our people used when travelling to their coastal mahinga kai.]*

### **7.2 Burial Caves**

*[There are several burial caves located on the block. The koiwi have been removed and reinterred elsewhere but the caves and the korero that attach to the place are an important cultural heritage site to Ngaati Rangima.]*

## **8.0 SITE LOCATION**

*[The mānuka and habitat that we are seeking to protect is located at 1122 Te Puaha Road and is held in CT A/34B21 within the South Auckland Survey Area. The block is 200 acres in size and is contained within a single CT.]*

## **9.0 TAKE – ISSUE AT HAND**

*[Myrtle rust has arrived in New Zealand and is attacking a number of our native raakau of the mānuka Jenaymoksceae family. For the purposes of this Protection Plan the taonga and habitat we are seeking to protect is the mānuka Sallaaydottiae.*

*Myrtle rust is a serious fungal disease that can affect our mānuka and we are concerned that should this disease take hold in our mānuka stand eventually we will not have any mānuka left for our use. A long and traditional relationship with the raakau and all associated practices, mātauranga and tikanga will eventually be lost through non-use.*

*The whakapapa relationship that Ngati Rangima share with our natural resources and the hereditary role of kaitiaki passed down through the generations places an obligation and responsibility on the hapu to do the best that we can to protect and ensure the survival of our wānanga and the whakapapa relationship.]*

## **10.0 ECOLOGICAL ASSESSMENT – WHAKAPAPA of the PLANT(s)**








### **10.1 Te Whenua - The Site**

*[The site is 200 acres. Of the 120 acres approximately 100 hectares is still covered in mānuka. On either side of the land block are farm blocks that have been almost cleared of all native vegetation except for small stands of bush in high erosion areas.*










*The site is on the side of a hill with the lower part of the block running parallel to the main road. The main raakau on the block is mānuka Sallaaydottiae.]*

## 10.2 Ngāhere - Other Vegetation

[Other native vegetation include tawa, swamp maire, kawakawa and pānakenake]

Trees – Rākaunui	Leaves	Fruit and flowers	Form	Uses and/or practices associated with them
Tawa - <i>Beilschmiedia tawa</i>				Kai – used to collect the berries  Kereru eat the berries – we used to harvest kereru
Swamp Maire – <i>Syzigium maire</i> [N.B. This can also be affected by myrtle rust]		 		Kai – we used to collect the berries



Trees – Rākaunui	Leaves	Fruit and flowers	Form	Uses and/or practices associated with them
Shrubs - rākau				
Kawakawa – <i>Piper excelsum</i>		<p>Male flower: </p> <p>Female: </p> <p>Fruit: </p>		<p>Rongoā - leaves</p> <p>Kai – harvested the orange fruit</p>
Climbers - Aka aka				
Groundcovers				
Paanakenake – <i>Lobelia angulata</i>		 		
Ferns, fungi, lichens				

### 10.3 Pest Plants

*[Pest plants found on the site include Nanaiamapsceae, Atapanecae and Blanesie.*

*Blanesie has been present on the site for three generations and is now considered part of the whakapapa of the site.*

*New incursions include Girleanthus, Marinapanthus and Nowielias.*

*A plant that turns up now and again is the Robertilicous. Just when we think it has been eradicated it turns up again. We are uncertain of the impacts of this plant; however, when it flowers it is a beautiful sight to see.]*

## 11.0 PATHWAYS FOR PATHOGEN

### 11.1 Wind

*[The mānuka block is surrounded by open farmland. The potential for myrtle rust to arrive airborne is high. The site is approximately 8 miles from the West Coast and is susceptible to coastal winds.]*

### 11.2 Direct Transfer

*[Ngāti Rangima permits whānau from surrounding marae to access the site to harvest mānuka wood, branches or to check beehives. There is the capacity for myrtle rust to be transferred to the site by our whanau on their clothes or tools used for harvest. We do not know if the bees are able to bring the disease onto the site.]*

## 12.0 FACTORS THAT COULD/ARE AFFECTING THE TAONGA

- *[Whānau accessing and using tools on the site without precautions being taken for direct transfer*
- *Lack of knowledge of the ability of bees to bring myrtle rust back onto the site*
- *Lack of knowledge of the ability of birds to transfer myrtle rust*
- *Strong coastal winds have the ability to bring myrtle rust to the site*
- *Windblown from passing vehicles*
- *Lack of understanding of myrtle rust, and lack of ability to identify the fungus*
- *Incursion of myrtle rust from bush remnants on neighbouring farmland*
- *Incursion from new plantings in the surrounding area*
- *Loss of ability for mānuka to reproduce if infected]*

## 13.0 SOLUTIONS TO RESOLVE or MITIGATE IMPACTS

### 13.1 Direct Transfer

- *[Develop a protocol for whānau and tools coming into the block*
- *Increase knowledge of potential transfer by bees and birds]*

#### 13.2.1 Wind

- *[Create a buffer on around the perimeter of the mānuka*
- *Investigate the feasibility of creating a buffer of alternative plantings (not myrtles) 10 metres inside the mānuka stand*
- *Build relationships and co-ordinated approach with neighbouring landowners to monitor their remnant bush stands for myrtle rust]*

#### 13.2.2 Seed Collection/Banking

- *[Seek expert advice for the viability of seed collection and banking e.g. is it possible to identify if seeds are affected by the fungus?*
- *Access training for Ngāti Rangima to build our capacity to undertake seed collection and options for seed banking.*
- *Assess the site for myrtle rust incursion to ensure that the fungus is not present and then collect the seeds.*
- *Collection and banking of seeds to ensure potential to re-establish mānuka in the future should the ravages of myrtle rust wipe out our stand of mānuka]*

#### 13.2.3 Capacity Building

- *[Build the capacity of Ngāti Rangima to provide the best possible protection that we can to protect our rākau*
- *Identify information and skills required to assist us in this journey*

- *Build relationships with individuals and/or agencies that are able to assist us in our efforts to protect our mānuka]*

#### **13.2.4 Cultural Heritage & Practices**

- *[Will the movement of mānuka from the site for cultural purposes i.e. hangi, brooms, fencing be restricted if myrtle rust is found on site?*
- *Record our practices, mātauranga, tikanga and whanaungatanga with the mānuka for our children and future generations*
- *Record the relationships of Ngāti Rangima and related hapū and marae whānau in relation to the mānuka and the whenua]*

#### **13.2.5 Cultural Sites**

- *[Record the histories of the walking track and burial caves*
- *Identify protection mechanisms for their protection in the event that the protective cover of the mānuka is lost]*

#### **13.2.6 Alternative planting for land block**

- *[Identify alternative plantings for the block in the event that we are unable to prevent the loss of our mānuka]*

#### **13.2.7 Honey Production**

- *[Investigate alternative commercial opportunities that contribute to land rates that Ngāti Rangima are required to pay to Councils*
- *Identify opportunities for rates remissions in the event that the property due to the effects of myrtle rust]*

### **14.0 TIMELINES FOR ACTION**

<b>ACTION from Plan</b>	<b>TASK</b>	<b>KEY STEPS</b>	<b>Partners to help us</b>	<b>Resource needs</b>	<b>DATE TO BE COMPLETED BY</b>	<b>KEY PERSON/ORGANISER</b>	<b>DATE COMPLETED</b>
Direct Transfer	<i>Develop a protocol for whānau and tools coming into the block.</i>	<i>Outline ways that whānau can keep themselves and their tools clean</i>	DoC – local rangers can give us advice about biosecurity/hygiene protocols		<i>End of April 2019</i>	<i>Uncle Jim &amp; Marae Komiti</i>	<i>30 April 2019</i>
	<i>Increase knowledge of potential transfer by bees and birds</i>		Manaaki Whenua District Council		<i>May 2019</i>	<i>Nana Sue &amp; scientist from Manaaki Whenua</i>	



## 15.0 SEED COLLECTION MAARAMATAKA

The image below shows the general time of year when our plants are flowering and fruiting in the Auckland (Waitakere) region [Photograph of the original copy in our possession; Waitakere District Council]



Plant to collect from	Time of year (in general)	Tohu	Location and GPS	Date collected and number	Storage location
Mānuka	Autumn	Mauku (cabbage tree) flowering and setting seed – this is important because of the slight changes in seasons occurring now	Te Pūaha – Waingohengohe headwaters  GPS:	20 <sup>th</sup> April 2019	
			Whangamarino Swamp GPS:		
Swamp Maire	Autumn	Matamata coming in	Akaaka swamp area GPS:		

## 16.0 MONITORING MAARAMATAKA

This is where whānau can build on their māramataka. The idea here is to for them to better understand the rhythms of their natural environment and themselves – i.e. the times when energy may be low for both them and the plants may dictate the success or not of seed collection, based on the plant wellbeing and the energy of the crew; the times when

it is best to prune; the times when the energy of the whenua is low may also dictate when the plant may be the most susceptible to the rust (esp. if it is in close vicinity).

## 9.5 Appendix 5. Protection plan – Ngātirua

# Ngatirua PROTECTION PLAN- Myrtle Rust

### 1.0 VISION STATEMENT – N/A

### 2.0 MISSION STATEMENT

Ngatirua is the hapu that resides within Whaingaroa/Whangaroa bound together by established Ngapuhi and Ngatikahu whakapapa. This generation seeks to maintain, preserve, protect and enhance the mauri of our rohe for present and future generations. Mana ao turoa, mana whenua, mana moana, mana tangata.

### 3.0 PROTECTION PLAN

**Key Outcome:** *To protect and enhance [our relationship with ...]*

**Targeted Beneficiary:** *Ngatirua Rohe*

**Problem:** *from myrtle rust*

**Action:** *in accordance with matauranga and best available science.*

### 3.0 VALUES & PRINCIPLES

The values and principles that will guide this Plan include:

- Taonga Tuku Iho
- Mohiotanga me Mātauranga
- Manaaki Te Tangata
- Ngatiruatanga.

### 4.0 SIGNIFICANCE OF TAONGA TO NGATIRUA

- Cultural identity
- Cultural authority
- Right to inherent Ngatirua practice
- Recognition of our relationship to Atua

### 5.0 Taonga to be protected

The purpose of this Protection Plan (the Plan) is to identify and implement processes and procedures to identify and protect our taonga from myrtle rust.

Plan includes:

- Myrtaceae (Ngatirua) on occupied land (landowners Taupo Road and Totara North)
- Myrtaceae on DoC managed land
- Pōhutukawa – Taupo Marae
- Pōhutukawa – Ngatirua coastline and river boundary.
- Introduced Myrtaceae by community for riparian planting and forest regeneration.

### 6.0 TRADITIONAL USES OF TAONGA

Ngatirua has multiple purposes for Myrtaceae (taonga) species. These include: firewood, tohu: (cultural indicators) for mahinga kai, hunting, gardening, as part of narratives that bind generations together, for shelter, for protection of wetlands, coast lines and riverways, as signposts (for direction), for waananga providing learning and exposure for our whanau and rangatahi.

### 7.0 OTHER MATTERS OF SIGNIFICANCE WITHIN THE ROHE

N/A

### 8.0 REGION LOCATION

The land and sea boundary is described by our Tupuna Hemi Riwhi, who gazetted the Ngatirua

Rohe Potae, as the traditional kaitiaki rohe:

*“Bounded by a line commencing at a point on the sea-coast in line with the south-eastern boundary of Allotment 14, Whakapaku Parish, in Block II, Mangonui Survey District; thence easterly generally along the sea-coast and to the middle of the entrance of the Whangaroa Harbour; thence up the middle of the harbour and Waihapa Bay to the mouth of the Waihapa Stream; thence westerly along the right line to the northernmost corner of Allotment 108, Kohumaru Parish, in Block IV, Maungataniwha Survey District; thence north-easterly along a right line, being the south eastern boundary of the Akatere Tribal Committee Area, herein before described, to the point of commencement.”*



## 9.0 ISSUE AT HAND

Myrtle rust was first reported in a nursery in Ngati Rehia on 3<sup>rd</sup> of May 2017. Ngatirua is approximately 20 km north of Kerikeri and is a favoured destination for people visiting Kerikeri and also an urban centre for whanau from Whangaroa and Kaero. Since the outbreak, there has been continued community projects that have planted riparian areas with Myrtaceae. Issues include:

- Lack of relevant and current information about myrtle rust and its spread available to kaitiaki, whanau and community
- Lack of resourcing being invested in hapu to manage outbreaks
- Continued planting projects using Myrtaceae
- Movement of beehives between manuka/kanuka stands
- Lack of engagement of DoC and Councils with organisations and communities.

## 10.0 ECOLOGICAL ASSESSMENT

- Ngatirua will develop a full inventory of Myrtaceae to identify the location of all our taonga stands. This will be developed with information and data from the DoC, whanau and private land occupiers.
- The inventory will determine if the Myrtaceae has been introduced in the last two years to Ngatirua and if we can determine, where it was sourced from. This will be useful if we determine that taonga from other rohe have adapted to myrtle rust.
- We will train and encourage whanau to use the myrtle rust app, and log the location of taonga plants. We expect that having access to this e-data will enable a full and comprehensive inventory of our taonga, and inform better management of the pathways that myrtle rust may be introduced, as well as increasing community awareness and vigilance.

## 11.0 PATHWAYS FOR PATHOGEN

### 11.1 Wind and Weather

Scientists advise that wind is the most likely vector of myrtle rust. Depending on time on seasons and because of the unpredictable nature of changing wind patterns influenced by climate change, the risk for sporulation of myrtle rust is amplified by both our spring and autumn weather patterns, which provide 3 – 4 hours of precipitation (moisture) with optimum temperatures in the host range of between 18 – 28°C.

## 11.2 Direct Transfer

We recognise that trappers, trampers, aviarists, DoC Rangers moving between regions, pig-hunters and community and kaitiaki involved in riparian planting and re-vegetation that have sourced Myrtaceae from nursery or areas outside the Ngatirua rohe, can potentially transfer myrtle rust.

## 12.0 FACTORS THAT COULD/ARE AFFECTING THE TAONGA

- Myrtle rust infection
- Lack of notification (too late)
- Lack of response to take action to remove parts of plants presenting with myrtle rust
- Lack of resourcing for training, community awareness and how to take action, monitoring and eradication (where possible)

## 13.0 SOLUTIONS TO RESOLVE or MITIGATE IMPACTS

### 13.1 He tangata

We acknowledge that direct transfer is human centric.

- Develop information and communication plan that would enable people to identify and report an outbreak to hapu. This includes:
  - Information bulletins
  - Workshops on identifying myrtle rust, and also using the Plant & Food Research methodology, remove parts of plant where the rust is present
  - Map where the myrtle rust is sighted and link whanau and community through e-technology
  - Work with industries such as: Basically Bush, (trappers), Whangaroa pig hunting club, beehive agents etc. and local community who live in the Ngatirua rohe, to implement strategies that minimise the spread within our rohe and from rohe to rohe
  - Work directly with Ngati Rehia to support their work to minimise spread.

### 13.2.1 Weather (Wind, Precipitation, Temperature)

- Introduce sensors (tower) at main points along the coastal front, and main valleys. The sensor will trace wind direction, and signal as well as record data that determine temperature and moisture. The modelling will enable better monitoring and provide some predictability, as optimum conditions for myrtle rust sporulation and spread can be determined.

### 13.2.2 Seed Collection/Banking

- GIS Map taonga susceptible to myrtle rust. Access information about our taonga lodged or held with DoC and/or FNDC and NRC.
- Ngatirua has been part of the myrtle rust Susceptibility Project with Scion and also had kaitiaki attend training in seed banking methodology. In addition to this, Ngatirua will partner with our wānanga, Te Aukiwa/Te Matakairiri, who have established a native nursery and invest in projects that build our collective capability to preserve seed.
- Build on maramataka of taonga, noting Ngatirua taonga flowering, seeding and harvesting times. Trace these over time across the rohe
- Ngatirua is cognisant that not all seeds will have viability and will identify resourcing and capability to explore traditional methods of seed collection, protection and storage as well as continue dialogue with scientists who are wanting to store germplasm.

N.B. All Ngatirua taonga accessed by other entities or individuals (agencies or organisations) for the purposes of research, conservation or commercial will need to demonstrate that the taonga material was acquired under free and prior consent and has a full cultural authority agreement that clearly lays out: provenance, permission, purpose, protection and a final date to review.

### 13.2.3 Capability Building

Ngatirua recognises that this work in protecting taonga species from myrtle rust requires an investment in the capability of our people and the capacity of Ngatirua to access resources and equipment to support the kaitiaki on the ground.

- The first step is to complete a capability audit.
- On completion of the capability audit, identify funding to support building Ngatirua capability to respond to biosecurity incursions, in this first instance myrtle rust.

- Any training should include traditional approaches to biosecurity and the 'biosecurity system' and where Ngatirua are involved in it.

#### **13.2.4 Cultural Heritage & Practices**

- Initiate waananga to discuss the significance and myrtle rust on our tohu and taonga. Discuss and implement the tikanga, which may include but is not limited to:
  - Mahinga kai
  - Pōhutukawa at our Marae
  - Tangihana
  - Tono
  - Collection and harvesting of taonga kakano.
- Develop policies and integrate into the Ngatirua Hapu Environmental Management Plan that adhere to tikanga; notify council and DoC of the Ngatirua policies.

#### **13.2.5 Ngatirua rohe – monitoring and surveillance**

- The Ngatirua rohe is significant to Ngatirua people and so taonga in our rangatira rohe will be afforded equitable status. We have over time established relationships with some of our taonga because of their use as tohu or they hold specific narrative. However, we are concerned with the potential extinction of taonga across our rohe, and are cognisant that we need to be vigilant for high risk sites, which may more susceptible because of environmental factors as well as adaptation by our taonga to myrtle rust by specific taonga. We will not recognise this adaptation if we are not monitoring all taonga. Our tikanga is to take the lead from Atua and our natural environment, as opposed to making discreet myopic observations. The modelling and notification of the presentation of myrtle rust will over time give us an indication of hotspots; however, at the outset, we will engage with our whanau and communities to undertake monitoring across our rohe.



## 14.0 TIMELINES FOR ACTION

ACTION from Plan	TASK	Key Steps	Others	Capability and Capacity	Time Frame	KEY PERSON/ORGANISER	DATE COMPLETED
13.1 He tangata	Develop an information and communication plan that would enable people to identify and report an outbreak or potential sighting to kaitiaki (hapu)	<p>Introduce workshops and use e-media to share information about myrtle rust and the implications within the rohe and to wider Ngatirua whanau and our communities inclusive of tramping groups, pig hunters, bee keepers, tohunga rongoa etc.</p> <p>Identify and work with industry to implement BPGs when working in our region i.e. Basically Bush, must train their trappers to clean their equipment and gear between rohe.</p> <p>Introduce app to whanau to report to report myrtle rust and to map the location of taonga species.</p> <p>Work with Ngati Rehia to support them preventing the spread of myrtle rust to our rohe</p> <p>Lodge policies and hapu Environmental Resource Management Plan resources with DoC and NRC/FnDC.</p>	Whanau, community, organisations, Crown agencies	Budget to be developed	August 2019 - ongoing	<p>Waitangi Wood Roopu Taio, Tau Iho I Te Po Trust</p> <p>Taupo Komiti Māori</p> <p>Papa Hapu</p> <p>Dan Ohalloran (DoC)</p>	November 2019

ACTION from Plan	TASK	Key Steps	Others	Capability and Capacity	Time Frame	KEY PERSON/ORGANISER	DATE COMPLETED
13.2 Weather (wind, precipitation, temperature)	Develop baseline data sets that enable modelling of wind, temperature and precipitation	With scientists, identify the most susceptible hotspots in our rohe. Develop a monitoring kit for kaitiaki and communities to collect data Talk with scientists about emergent or existing tools and/or technology that will provide us with the monitoring information Map data and information against taonga and locations of taonga Monitor for outbreaks recording data for protection	Plant & Food Research, Scion, community - mainly land occupiers in our rohe	Budget and resourcing to be identified	August 20129	Waitangi Wood Roopu Taio Tau Iho I Te Po Trust	November 2019 - ongoing
13.3 Seed collection and banking	Map, harvest and protect taonga kakano	GIS Map taonga susceptible to myrtle rust. Access information about our taonga lodged or held with DoC and/or FNDC and NRC.  Ngatirua has been part of the myrtle rust Susceptibility Project with Scion and also had kaitiaki attend training in seed banking methodology. In addition to this Ngatirua will partner with our wānanga, Te Aukiwa/Te Matakairiri, who have established a native nursery and invest in	EsRi (ArcSoftware renewal)  Annwyn Buchanan Te Aukiwa  Wilfred Peterson Te Aukiwa  Suzee M Taonga specialist  Tohe Ashby	GiS Software and laptop  Mentor (Hineamaru Lyndon)  Link to Auckland botanical gardens – training initiative  Potential funds PGF, environmental funds (regional)	Current	Waitangi Wood Roopu Taio Tau Iho I Te Po Trust	Ongoing

ACTION from Plan	TASK	Key Steps	Others	Capability and Capacity	Time Frame	KEY PERSON/ORGANISER	DATE COMPLETED
		<p>projects that build our collective capability to preserve seed.</p> <p>Build on maramataka of taonga noting Ngatirua taonga flowering, seeding and harvesting times. Trace these over time across the rohe.</p>	<p>Tohunga</p> <p>Moana Wood Tohunga</p> <p>Taupo Komiti Māori</p> <p>Dan Ohalloran DoC Rainger</p> <p>Erica Whyte Taupo Landcare</p> <p>Scion</p> <p>Plant and Food</p>				
	Ngatirua is cognisant that not all seeds will have viability and will identify resourcing and capability to explore traditional methods of seed collection, protection and storage as well as continue dialogue with scientists who are wanting to store germplasm	<p>Two-fold:</p> <p>A) Introduce cultural authority agreements across all Ngatirua taonga collected/collections</p> <p>B) work with Te Tira whakamataki to establish and recognise cultural authority agreements across germplasm collected for the purpose of the myrtle rust response.</p>	<p>MPI, DoC, Crown Research Institutes Te Tira Whakamatataki</p> <p>Taupo Komiti Māori</p> <p>Crown Research Institutes – Scion, Plant &amp; Food Research</p> <p>Other research entities</p>	<p>Support from Te Tira Whakamataki</p> <p>Other kaitiaki</p>	Initiated	<p>Waitangi Wood Roopu Taio Tau Iho I Te Po Trust</p> <p>Taupo Komiti Māori</p>	December 2019
13.4 Capability Building	Complete capability audit for Ngatirua, our community, and also Te Aukiwa	Develop capability audit Waananga/hui to establish the initiative, issue to whanau and community who want to be involved in	<p>Erica Whyte,(Taupo land occupiers) Annwyn Buchanan (Te Aukiwa)</p> <p>Taupo Komiti Māori</p>	Will have to seek funding for engagement. This audit will probably be progressed by the	August 2019	Waitangi Wood Roopu Taio Tau Iho I Te Po Trust	December 2019



ACTION from Plan	TASK	Key Steps	Others	Capability and Capacity	Time Frame	KEY PERSON/ORGANISER	DATE COMPLETED
		the Ngatirua response to myrtle rust	Roopu Rangatahi	Trust as pivotal to future funding and response.			
13.5 Cultural Heritage and Practices	Initiate waananga to discuss the significance and myrtle rust on our tohu and taonga, capturing narrative that will inform the production and adoption of hapu environmental policies that address myrtle rust	Waananga x2 Engagement with community, DoC, FNDC and NRC, other hapu in the Whangaroa rohe Policy/s lodged	FnDC, NRC, Council, Hapu in Whangaroa rohe	Capability in-house to develop policies, additional resourcing for waananga and engagement with other hapu and communities	August 2019	Waitangi Wood Roopu Taio, Tau Iho I Te Po Trust  Annwyn Buchanan Te Aukiwa  Sailor Morgan Hemi Rua Whakaraaraa  Aunty Babe Baker Ngati Rangimamoe  Robyn Tauroa Papa hapu/Ngati Uru  Hinemoa Pourewa Matangirau  Steven Mckenzie Waitaruke/Waihapa  Tangata Māori Technicians in Te Tai Tokerau, which include but are not limited to: Patuharakeke, Taiamai, Te Paatu, Ngatikahu ki ko, Te Rarawa, Ngatiwai, Ngati Hine, Te Uri O hau	March 2020
Ngatirua rohe Monitoring and surveillance	Monitoring and surveillance	Initiate training Central data and information for Ngatirua to	DoC, Community, Whanau, kaitiaki, hapu	Most of this will initially be voluntary and will rely heavily	Initiate in August 2019	Waitangi Wood Roopu Taio Tau Iho I Te Po Trust	Ongoing

ACTION from Plan	TASK	Key Steps	Others	Capability and Capacity	Time Frame	KEY PERSON/ORGANISER	DATE COMPLETED
		Ngatirua (Tau Iho I Te Po Trust) using myrtle rust app.	(in Ngatirua rohe and the wider rohe of Whangaroa)	<p>on people being engaged to the Ngatirua response. The response to myrtle rust will be integrated with other Ngatirua projects, such as the Pest Plant project, currently underway.</p> <p>In addition, resourcing may come by way of research initiatives that are looking for hapu strategic partners to test methodologies or technologies to monitor or identify where myrtle rust is.</p>		<p>Erica Whyte (Taupo land occupiers)</p> <p>Annwyn Buchanan Wilfred Peterson (Te Aukiwa)</p> <p>Roopu Rangatahi</p> <p>DoC and Council (potentially)</p>	

## 9.6 Appendix 6 Protection plan

### Survey / Interview Information

#### ABOUT THE SURVEY / INTERVIEW

Te Tira Whakamātaki has been asked by Plant & Food Research to conduct interviews and surveys on the impacts of the ongoing myrtle rust incursion. The aim of the study is to understand the views of whānau and hapū in relation to the myrtle rust incursion and ongoing response, as well as biosecurity more widely.

We appreciate your taking time to answer the questions. They should take about 15 minutes.

The data will be held on a secure server, and because the survey/interview does not collect identifying information, your response cannot be linked to you.

This survey has been independently reviewed by Te Tira Whakamātaki research associates and our kaitiaki. Your response will be collated with other responses to prepare a report for Plant and Food Research and Te Tira Whakamātaki kaitiaki. The report may be published, but there will be no record of whether or not you have participated.

As always, you have the right to:

- i. Decline to answer any question(s).
- ii. Stop the survey/interview at any time.

The lead researcher for Te Tira Whakamātaki is Melanie Mark-Shadbolt and if you have any questions or concerns about the research, you may contact her at [mel@ttw.co.nz](mailto:mel@ttw.co.nz)

Submission of the completed survey/interview will be taken as your consent to participate in this research. Because the data is completely anonymous, you will not be able to withdraw your information at a later date once you submit the completed survey.

If at any time you wish to withdraw from the survey, simply close the survey. Incomplete surveys will be discarded on Sunday, 30 June 2019. If at any time you wish to withdraw from the interview, simply tell the interviewer to stop. Stopped interviews will be discarded immediately.

To begin the survey, click on the button below. To begin the interview, start now,

Many thanks for your help.

Yours sincerely

Te Tira Whakamātaki

- |   |                                      |
|---|--------------------------------------|
| <input type="checkbox"/> Northland          | <input type="checkbox"/> Wellington  |
| <input type="checkbox"/> Auckland           | <input type="checkbox"/> Tasman      |
| <input type="checkbox"/> Waikato            | <input type="checkbox"/> Nelson      |
| <input type="checkbox"/> Bay of Plenty      | <input type="checkbox"/> Marlborough |
| <input type="checkbox"/> Gisborne           | <input type="checkbox"/> West Coast  |
| <input type="checkbox"/> Hawke's Bay        | <input type="checkbox"/> Canterbury  |
| <input type="checkbox"/> Taranaki           | <input type="checkbox"/> Otago       |
| <input type="checkbox"/> Manawatu/Whanganui | <input type="checkbox"/> Southland   |

**2. Which of the following best describes where you usually live?**

- ☐ A main city (e.g., Auckland, Hamilton, Wellington, Christchurch, Dunedin)
- ☐ A provincial town (e.g., Whanganui, Invercargill, Gisborne, Nelson)
- ☐ A rural area/settlement/village (e.g., Waikuku, Fielding, Waipu, Waipukurau)

**3. In which age group do you belong?**

- |                                      |  |
|--------------------------------------|--|
| <input type="checkbox"/> 18-19 years | <input type="checkbox"/> 45-49 years       |
| <input type="checkbox"/> 20-24 years | <input type="checkbox"/> 50-54 years       |
| <input type="checkbox"/> 25-29 years | <input type="checkbox"/> 55-59 years       |
| <input type="checkbox"/> 30-34 years | <input type="checkbox"/> 60-64 years       |
| <input type="checkbox"/> 35-39 years | <input type="checkbox"/> 65-69 years       |
| <input type="checkbox"/> 40-44 years | <input type="checkbox"/> 70 years and over |

**4. Which gender do you identify as?**

- ☐ Male
- ☐ Female
- ☐ Gender diverse
- ☐ Other

**5. Which ethnic group/s do you belong to?**

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> New Zealand European | <input type="checkbox"/> Niuean  |
| <input type="checkbox"/> Māori                | <input type="checkbox"/> Chinese |
| <input type="checkbox"/> Samoan               | <input type="checkbox"/> Indian  |
| <input type="checkbox"/> Cook Island Māori    | <input type="checkbox"/> Other   |
| <input type="checkbox"/> Tongan               |                                  |

**6. What hapū / iwi do you belong to?**

---

**KAITIAKI PRACTICES**

**7. Is protecting the environment important to you?**

- ☐ Yes
- ☐ No
- ☐ Unsure

**8. Are you currently, or have you ever, undertaken paid work to help protect the environment?**

- ☐ Yes
- ☐ No

*Please only answer 'yes' if the main purpose of your job is, or was, to protect the environment.*

**9. Are you currently, or have you ever, undertaken kaitiaki mahi i.e. unpaid (volunteer) work to help protect the environment?**

- ☐ Yes
- ☐ No

**10. If yes what type of volunteer work did you undertake?**

- |  |   |
|--|---|
| <input type="checkbox"/> Beach, marine clean-ups   | <input type="checkbox"/> Monitoring, species counting                                   |
| <input type="checkbox"/> River, waterway clean-ups | <input type="checkbox"/> Harvesting/recovering/saving whales and dolphins (sea mammals) |
| <input type="checkbox"/> Pest eradication          | <input type="checkbox"/> Seed collection  |
| <input type="checkbox"/> Weed eradication          | <input type="checkbox"/> Other _____  |
| <input type="checkbox"/> Planting, revegetation    |   |

**11. How often, if at all, do you personally do the following?**

	Every week	Every 2-3 weeks	About once a month	Every 2-3 months	About once a year	Less than once a year	Never
Compost organic waste	1	2	3	4	5	6	7
Help clean local beaches, rivers, or streams	1	2	3	4	5	6	7
Choose native plants to have in your home	1	2	3	4	5	6	7
Recycling glass, paper, cans, soft plastics	1	2	3	4	5	6	7
Trapping or controlling rats, stoats and/or possums	1	2	3	4	5	6	7
Go into the bush or ngahere	1	2	3	4	5	6	7
Monitor the health of environment	1	2	3	4	5	6	7
Conduct species surveys	1	2	3	4	5	6	7

**PEST ERADICATION**

**12. Have you heard about the Government's initiative to rid New Zealand of predators by 2050?**

- ☐ Yes  
☐ No

**13. Do you think it is achievable?**

- ☐ Yes  
☐ No  
☐ Don't know  
☐ Don't care

**14. Do you think we should eradicate invasive species?**

- ☐ Yes  
☐ No  
☐ Don't know  
☐ Don't care

**15. There are a number of ways to control species which are considered to be pests. Can you tell us which ones you are comfortable with, and which you are uncomfortable or unsure about?**

*Please indicate your general attitude towards the pest control methods listed below.*

	Should never be used under any circumstances	Should only be used as a last resort	I am uncomfortable with this method but will accept it as long as appropriate controls are in place	I am comfortable with this method as long as appropriate controls are in place	I have no concerns at all about this method	I don't know
Hunting	1	2	3	4	5	6
Trapping	1	2	3	4	5	6
Poison bait laid by hand	1	2	3	4	5	6
Poison bait spread by aircraft	1	2	3	4	5	6
A new toxin that is species-specific (e.g., only kills rats)	1	2	3	4	5	6
Approaches involving selective breeding in the laboratory that result in infertile males	1	2	3	4	5	6
Approaches involving genetic editing that result in most offspring being male	1	2	3	4	5	6
Gene drive technique	1	2	3	4	5	6
Trojan female technique	1	2	3	4	5	6
Pheromone technique	1	2	3	4	5	6

*Note:*

**Gene-drive technique** is a technology that spreads a particular gene throughout a population by altering the likelihood that a specific variant of a gene will be transmitted to offspring (i.e. female chromosome is removed so only male offspring are produced).

**Trojan female technique** is a new technology being developed that causes a reduction in reproduction through a form of sterilisation (i.e. trojan females carry a mutation that means their female descendants produce sterile males).

**Pheromone technique** is a technology that manipulates male sexual behaviours (i.e. a scent attracts males, they are then covered in a substance that attracts only other males to them).

- 16. The following is a list of species that have been introduced to New Zealand in different ways. Based on what you have seen or heard, to what extent do you believe each is a threat to New Zealand's native plants, animals or natural environments?**

	1 - No threat at all	2	3 - A moderate threat	4	5 - A very serious threat	Don't know
Rats	1	2	3	4	5	6
Stoats	1	2	3	4	5	6
Possums	1	2	3	4	5	6
Wasps	1	2	3	4	5	6
Deer	1	2	3	4	5	6
Wild/feral cats	1	2	3	4	5	6
Kauri dieback disease	1	2	3	4	5	6
Myrtle rust disease	1	2	3	4	5	6
Pigs	1	2	3	4	5	6

- 17. Please rate your level of agreement with the following statements about pests which have been introduced to New Zealand and the methods for controlling them.**

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Pest species are a significant conservation problem.	1	2	3	4	5	6	7
Pest control interferes with nature.	1	2	3	4	5	6	7
The benefits of pest control outweigh the risks to native species.	1	2	3	4	5	6	7
Pest control has unknown side effects.	1	2	3	4	5	6	7
Native species have greater rights than pest species.	1	2	3	4	5	6	7
Today's pest control methods are proven to be ineffective.	1	2	3	4	5	6	7
Investment in pest control is beneficial for future generations.	1	2	3	4	5	6	7
Pest control is less important than other conservation issues.	1	2	3	4	5	6	7
There is enough pest control being done already.	1	2	3	4	5	6	7
To protect New Zealand's native species, we should kill rats, possums and stoats.	1	2	3	4	5	6	7
We should replant native plants/bush to protect New Zealand's native species.	1	2	3	4	5	6	7
Treaty obligations should guide and give effect to decisions about eradicating	1	2	3	4	5	6	7

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
pests.							

- 18. As the kaitiaki of land, flora and fauna that have been decimated by pests, how much do you agree or disagree with the following new technologies being used?**

	Strongly agree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly disagree
A poison that only attracts wasps	1	2	3	4	5	6	7
Transplanting animal organs into humans	1	2	3	4	5	6	7
Introducing a disease-carrying mite into a wasp nest	1	2	3	4	5	6	7
Genetic modification of our food	1	2	3	4	5	6	7
A pheromone/chemical lure that attracts wasps into a trap	1	2	3	4	5	6	7
Modifying wasp queen DNA so she produces infertile males	1	2	3	4	5	6	7

- 19. To what degree do the following factors influence your decisions regarding protecting New Zealand's natural environment (e.g. conservation)?**

	1 – no influence at all	2	3	4 – a moderate influence	5	6	7 – completely influences
Whanau/family wellbeing	1	2	3	4	5	6	7
Principles of the Treaty of Waitangi	1	2	3	4	5	6	7
Māori tikanga (protocols), such as manaakitanga	1	2	3	4	5	6	7
Iwi tikanga (tribal protocols)	1	2	3	4	5	6	7
Broader wellbeing of my society	1	2	3	4	5	6	7
Financial considerations	1	2	3	4	5	6	7

- 20. What should take priority when planning pest control?**

*(Please rank the statements below in order of importance with 1 being the most important and 4 being the least important)*

	Wellbeing of our native taiao ecosystems
	Maintaining food systems (both native and introduced)
	Income for hau kāinga
	Involvement of hau kāinga



**21. Who should lead environmental decision-making in Aotearoa New Zealand?**

*(Please rank the organisations below in order of importance, with 1 being your favourite leader and 4 being your least preferred leader)*

	Communities (self-organised)
	Department of Conservation
	Iwi or Hapū Entities
	Environmental Not-for-Profits
	Ministry for the Environment
	Ministry for Primary Industries
	Councils
	Other (name): _____
	Other (name): _____

**BIOSECURITY**

**22. Have you heard of biosecurity or the biosecurity system?**

- ☐ Yes  
☐ No  
☐ Unsure

**23. How much do you agree with or disagree with the following about biosecurity?**

*Biosecurity is about stopping pests and diseases from entering the country, and dealing with them if they do enter the country.*

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I am knowledgeable about biosecurity.	1	2	3	4	5	6	7
Biosecurity is a government priority.	1	2	3	4	5	6	7
It is important to keep New Zealand free from new pests and diseases.	1	2	3	4	5	6	7
Biosecurity is a separate issue from conservation.	1	2	3	4	5	6	7
Biosecurity is important to New Zealand's export industry.	1	2	3	4	5	6	7
I have an important role in making sure pests and diseases do not get into New Zealand.	1	2	3	4	5	6	7
If pests and diseases do get into New Zealand, I have an important role in making sure they do not spread.	1	2	3	4	5	6	7
Biosecurity is important to me.	1	2	3	4	5	6	7

**MYRTLE RUST SPECIFIC**

**24. Can you name a current biosecurity issue?**

- ☐ No  
☐ Yes  
☐ If YES, which one? \_\_\_\_\_

**25. Have you heard of myrtle rust?**

- ☐ Yes  
☐ No  
☐ If YES ...

What have you heard? \_\_\_\_\_

\_\_\_\_\_

From whom? \_\_\_\_\_

\_\_\_\_\_

**26. Have you been involved in the myrtle rust response?**

☐ Yes (go to question 27)

☐ No (go to question 35)

**27. How and why did you first become involved in the myrtle rust response?** *(Did you volunteer or put yourself forward in some way, or where you put forward for a reason?)*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**28. Were you supported to respond to myrtle rust in your region?** *(either via encouragement to join, or financial support etc.?)*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**29. What opportunities did you have to become more involved in myrtle rust?** *(For example, were you able to attend events, meetings, training etc.?)*

\_\_\_\_\_

\_\_\_\_\_

**30. What are/were your main motivations for wanting to be involved in myrtle rust work?**

\_\_\_\_\_

\_\_\_\_\_

**31. In your view, have any groups or individuals been essential to developing constructive interactions or enabling you and others to be involved in myrtle rust?**

\_\_\_\_\_

\_\_\_\_\_

**32. How do you feel about your degree of involvement overall in the myrtle rust programme?**

\_\_\_\_\_

\_\_\_\_\_

**33. How effective or important do you think your individual or group contribution has been in the myrtle rust programme?**

\_\_\_\_\_

\_\_\_\_\_

**34. What kinds of constraints or barriers have you personally experienced that limited your involvement or effectiveness in the myrtle rust programme?** *(e.g. lack of knowledge, lack of funds, lack of commitment, lack of time, lack of coordination)*

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**35. Have you been involved in other biosecurity incursions, responses or programmes?** *(including long-term pest management programmes)*

- ☐ Yes (continue with question 36)  
☐ No (go to question 39)

**36. What was the biosecurity incursion, response or programme you've been involved with?** *(including long-term pest management programmes)*

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**37. What involvement did you have in that biosecurity incursion, response or programme?** *(including long-term pest management programmes)*

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**38. What constraints or barriers were or are there to your involvement in biosecurity incursions, responses and or programmes?** *(including long-term pest management programmes)*

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**39. What opportunities are there for you and your communities to be more involved in biosecurity incursions, responses and or programmes?** *(including long-term pest management programmes)*

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**40. What capacity and capability do you and your communities have to be involved in biosecurity incursions, responses and or programmes?** *(including long-term pest management programmes)*

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**41. What resources do you and your communities have to be involved in or act/respond to biosecurity incursions, responses and or programmes?** *(including long-term pest management programmes)*

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42. What support or engagement do you believe would enable you and your communities to be involved in the long-term management of pests and or biosecurity incursions, responses and or programmes?

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## SCIENCE AND BIOSECURITY

43. When and or where has 'science' benefited kaitiakitanga and rangatiratanga in the response to a biosecurity incursion/issue and or myrtle rust specifically?

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44. How can or has science contributed to the needs of kaitiaki and rangatira in the biosecurity and wider environmental space?

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45. How do we support and protect Māori who have and want to use mātauranga Māori solutions to foreign species or disease, but may not want to share their solutions with non-Māori scientists or organisations?

## Mātauranga Māori – Responses to questions

1. When and or where has 'science' benefited kaitiakitanga and rangatiratanga in the response to a biosecurity incursion / issue and or myrtle rust specifically?

Generally tangata Māori agree that there is a role for science that can support and enable their kaitiakitanga and rangatiratanga in a biosecurity incursion and also more specifically in a response to myrtle rust. Respondents cited the initiatives and projects that hapu/iwi have worked directly with scientists and noted good and mutually beneficial outcomes, as well as the strengthening of strategic trust relationships. Whilst hapu and Iwi kaitiaki will work with scientists to better understand the introduced and 'new' species that are a risk to their taonga and biodiversity, they are consistent that their mātauranga, underpinned by their intimacy with their taonga, is key to addressing and responding effectively to biosecurity incursions and more specifically myrtle rust. As tangata Māori have had more exposure to science, they are adamant that mātauranga Māori is its own knowledge system and does not require western science to be juxtaposed against it to demonstrate its validity. Respondents raised the importance of valuing mātauranga Māori in its own right and advocated for investment in maintaining and ensuring the protection of mātauranga, respecting that it is best placed as a foundation solution to emergent and existing biosecurity incursions. Some other key themes included the sharing of knowledge by scientists with kaitiaki, who then make the decisions about how to respond and plan/respond to an incursion, learning from the past; that actions based purely on western science, without consideration of kaitiaki and rangatira who have intimacy with their taonga, are detrimental to the protection of our natural biodiversity. Underpinning these solutions is tangata Māori advocacy for balance.

## Respondents

Don't know

Not sure

Seems to me that science has a huge potential to be useful, but is fighting a huge battle as more and varied potential invasive species hit the country. It's pretty tricky, as, for example, global transport systems have become so sophisticated, large, and all-reaching, that it is almost impossible for science, and the knowledge systems that science feeds into, to keep up.

Good question

In terms of protecting and utilising the environment that iwi and hapu has interest in through commercial and marine development, understanding that certain restrictions are put in place due to a biosecurity incursion and a quarantine is in place for example three months. This is consistent with kaitiakitanga. Used correctly science is important in dealing with the invasive species.

When science has worked with iwi in Kaitiakitanga it has worked e.g. Ngatihine, Landcare Research, Department of Conservation and the local community.

Science has enabled kaitiaki to learn and understand the new biosecurity incursions, like myrtle rust on a national level.

KD HTHF example - shared science and mātauranga solutions

We have worked with NIWA to increase the number of tuna in our local awa; however, this scientific approach is improved by working science with mātauranga Māori. Local remedies to treat kauri dieback have also seen science-based and mātauranga-based research to find effective remedies.

unsure

Some western science mixed with our mātauranga Māori helps with modern problems.

Western science or knowledge is never a benefit to kaitiakitanga. Both knowledge systems ought to work in harmony rather than the arrogance of one of the other. Knowledge by measurement has its place alongside mātauranga Māori, no longer over mātauranga Māori and whakaaro Māori.

Science is important to our kaitiaki as it provides information about the introduced species. In addition to the science, we need to invest in relationships with indigenous peoples who are intimate with these exotic species and learn from indigenous peoples. Scientists have also been more receptive to engaging with hapu and recognising their cultural authority over taonga, working with them to support the recognition of the implications of emergent technology that tangata Māori do not have an appetite for.

Given the incursion a name

The last hui I was part of science was there was still a gap between science and mātauranga. I think once there is some base data gathered and shared there may be a shift; however, I am concerned that science will always stand independent of traditional mātauranga and we will never truly understand the impacts of biosecurity incursions, only understand half of the situation. If we look to centre our indigenous knowledge and complement this knowing with science we might have a chance to understand the behaviours of new incursions and how they might be managed.

Rena oil spill; Whale rescue

Recently

Education on how it spreads

Don't know that it has.

No benefit

Probably never

I do not know

Increase of whanau knowledge and notification of incursions

Kaitiakitanga and science is the same thing, only, kaitiakitanga is intrinsic to your whakapapa. Science is just a small part of the way kaitiakitanga is analysed before being administered. In terms of myrtle rust, the scientist get informed before mātauranga Māori experts, so they tend to have more understanding of it.

Never - when you are proactive and inclusive and provide a cultural model/method - Westernize do not know how to incorporate in their management strategy

Unsure

None that I know of - rather kaitiakitanga and rangatiratanga have benefited science

Mātauranga Māori is a science as is kaitiakitanga. lack of recognition of this fact is inhibiting progress e aua

when taking scientific samples

I do not know of an example

Queensland fruit fly - science built knowledge around species itself including its life cycle, so was able to be contained quickly

Don't know

Don't know of any.

nil

Science has assisted in the identification of pathways relevant to the incursion, enabling kaitiaki to better understand response options.

Not really at this stage

- Te Potae o Ruahine trapping pgm bordering PCE & trust lands - Whio surveys w tangata whenua involvement - Whakawhanaungatanga between tangata whenua of Russell State Park and Nga Pae Maunga o Ruahine, Nga Pae Maunga o Kaweka

I guess ... being open in providing some scientific identifiers ... but also ... management going forward

I do not know

Putting scientific knowledge on the table for Māori to make decisions.

I do not know.

It has given Kaitiaki O te taiao the opportunity to see what pakeha science and research methods around the threats of the threats at the forefront allowing Hapu Iwi to come up with their mātauranga tikanga to re balance the effects that pakeha science and research evidence has forgotten about or missed

## **2. How can or has science contributed to the needs of kaitiaki and rangatira in the biosecurity and wider environmental space?**

Respondents discussed their frustration reiterating that Māori knowledge system is sophisticated and has value over and above being a validating platform for western science. Although there is obvious fatigue in echoing their position on the value and validity of mātauranga Māori as a stand-alone science system, there is acknowledgement that science brings tools and methodologies that can be adopted by kaitiaki and rangatira that resonant and have synergies with their own traditional approaches. Respondents recognised that there is significant investment in the New Zealand 'science system', and that as tangata Māori, resourceful, innovative and tech-savvy, become more sophisticated in adopting tools for monitoring, surveillance and/or managing or eradicating a biosecurity incursion, that investment should be made in building the capacity of hapu/iwi to work with scientists and encourage scientists to work with hapu/iwi. This was evidenced by the respondents' presentations of instances and projects that have had successful outcomes because of this investment and consideration, valuing the role of tangata Māori as kaitiaki and rangatira of taonga.

### **Respondents**

Don't know

If I use kauri dieback (KDB) and an example, science around the pathology and strains of the disease, and mechanisms for disease spread, are very important to help manage the disease itself. There is also utility in data management systems that can be used to identify kauri tree locations, and the incidence of KDB therein.

Can provide facts but should not substitute, disregard or disrespect mātauranga

It can contribute to the needs of iwi and hapu by fully engaging with them to implement their environmental objectives, including fully funding iwi and hapu science scholarships, biosecurity courses or programmes and full fund resource management units.

Not sure what the question is asking

Provide information.

some tests/sampling/tools we can use alongside our kaitiaki monitoring

Not enough, however, that is changing. In the past we and our tikanga, our kawa were researched as "lab rats", or dismissed as irrelevant, but now there is a more informed approach that has research undertaken by or with tangata whenua.

Unsure but I suppose it would help in hapu and communities analyse data

Use mātauranga Māori

Western science or imperialism commenced the massive problem, therefore, western science alone has little to contribute; except mass slaughter of pests and native creatures and finally nature.

Identifying pests Identifying possible solutions

Partnering, re-distribution of science budgets and resources, provide information to hapu and kaitiaki about invasive species, would also like to recognise National Science Challenge: Biological Heritage for their focus on mātauranga Māori within their prioritisation, shifting the importance of cultural licence.

Science has given some explanation to how an incursion has arrived, where from and what it looks like. Science could give effect and weight to mātauranga Māori. With thousands of years of historical knowledge in the environmental space I believe Māori have a lot to offer to science but do not believe it is given the respect it deserves.

I am suspicious that traditional indigenous knowing is still not being taken seriously. Until science acknowledges indigenous knowledge as equal there will always be tensions in how biosecurity incursions are managed.

Kauri dieback, whitebait, ecology, sand dunes, pipi monitoring

Contributes to understanding the impacts of biosecurity incursions

Sharing of knowledge and data collection

Don't believe it has.

Don't think it has.

Allow kaitiaki to have more say in their rohe.

Probably helping now with replanting

I do not know

Increasing whanau knowledge and notifying of incursions

Science is the observation of the world around us - kaitiaki are the responders to that researched information. Again, kaitiaki are scientists.

You can't infuse Mātauranga Māori into western practice (science). Cultural values are based on facts and long-time relationships as science is unknown and can't guarantee a result

In helping to understand and build a solution. Also in validating mātauranga that is usually ignored

I can't say - it has done nothing but disrupt, damage, exploit and destroy

Science can be both a problem and a solution. Science used for profit has caused several multi-million dollar disasters in terms of biosecurity incursions. Downgrading of controls at the border is the other key issue along with the free trade scenarios playing out

I'm sure it has, since science is simply accumulated and tested knowledge - or something like that some knowledge of kauri dieback

I do not know of an example

It is about bringing different ways of knowing together and identifying the gaps and synergies

It provides us with information and technologies that we can then decide if we want to utilise to restore our environment.

Don't know

phosphite injections has slowed PTA down

By providing data, fact-based evidence

Greatly but with the evidence we need action plans now. Run spaces where community involvement is essential.

Providing response options based on Mātauranga Māori i.e. KDB

Not sure

In progress

Nga Whenua Rahui - great to start with; however, very slow to respond to our requests over the last 5-10 years GIS training - with Duane Wilkins - online community - need help with hardware & software, more roadshows training to trustees, decision makers related to succession planning DoC - boost pre-existing relationships so they flourish and impact / influence more reluctant individuals, trusts & boards Scientific identifiers ... and ongoing research ... working with local knowledge

Gives more options

Share scientific knowledge for inclusion or exclusion.

I do not know.

Funding training and resources to achieve Tangatawhenua Kaitiaki O te taiao goals at a pakeha science and research standard or best practice allowing kaitiaki to critically analyse and encompass

the mauri of te taiao and historical and present practices to come up with a tikanga Māori process for the Tangatawhenua Kaitiaki O te taiao

### **3. How do we support and protect Māori who have and want to use mātauranga Māori solutions to foreign species or disease, but may not want to share their solutions with non-Māori scientists or organisations?**

Many respondents highlighted the importance of establishing trust with scientists and others that want to access mātauranga Māori and the need to build strategic trust relationships. Other respondents felt that the best way to protect knowledge holders is to establish Intellectual Property agreements, with consideration that once the knowledge holder shares their knowledge it is now someone else's knowledge. Respondents felt it is important to respect both the knowledge holder and his/her knowledge, and that this distinction is made in any agreement.

Many respondents felt that where the knowledge holder had a solution that they were willing to share, that support was provided by whanau and other tangata Māori to enable the sharing of the solution or mātauranga through waananga, kanohi ki te kanohi with the community or the kaitiaki that would use it. Respondents believe that the way in which their mātauranga Māori is shared is to be determined by the knowledge holder. In addition, respondents highlighted the value of the solution underpinned by mātauranga Māori, and although not attributing monetary value, concurred that there are costs associated with the development, testing/trialling and sharing of the mātauranga Māori solution, and that this should be resourced/remunerated equitably to science research projects.

#### **Respondents**

In the same manner that we protect any other members of society that have valuable information that they may not wish to share.

True collaboration

I support this, knowledge is power and its protection of intellectual property could be used against Māori instead and restrict Māori from finding solutions to foreign invaders or outbreaks etc.

This is not a one sentence answer. Briefly there needs to be trust. Trust is only acquired through building long-term relationships. In generalising science want to be paid for their science and their discoveries and Māori look to benefits for future generations (kaitiakitanga) which is in my mind sustainability

In whatever way we can, financially, resources, etc.

Strict IP controls that adhere to UNDRIP and other relevant indigenous conventions

Support and encourage funding of mātauranga research, with tolerance and patience in the research outcomes. The more we do, the better we will get. Readiness to accept other paradigms of knowledge, other than western science, but open to indigenous knowledge, the faster solutions might be found

The first step is recognition of mātauranga Māori solutions at national and local government level and knowing that mātauranga Māori should sit alongside science, and that those aspects are complementary

Have trust that Māori have solutions

Listen, understand, and talk with us. Don't tell us what to do anymore.

Assist with the protection of intellectual property. Result-based funding; assistance with funding research and development; funding trials

Intellectual Property protection education in the field of science funding

Invest in strategic trust relationships with hapu/iwi who will take care of their own.

IP must be protected. Mataatua agreement as a starting point. Provide scientific training in a Māori format i.e. In a setting that is familiar not foreign to the Māori way of life. This way Māori science and western science could elevate a greater knowledge base. There are likely synergies with Māori science and western science but possibly present differently.

Resource iwi, hapu or Māori lead research organisations. the solutions are for Aotearoa not the rest of the planet. Our knowing, our traditions, our medicines are only relevant here. if mātauranga has answers it should not matter that Māori hold the knowledge, it will still benefit the nation.

Funding and workshops

Enabling Māori by providing resources and support



Regular hui and training opportunities for different kaitiaki groups to meet up and Wānanga

Don't know

Use the technique but not divulge the source.

Give a limited contract to the person to prove success and ingredients kept confidential. If proven successful, extend contract.

A contract to for the people who have the mātauranga. Patent it.

A contract where only the people who know the solution do the work.

Put protections in place and keep the secret safe.

I do not know

Protect by Māori practitioners applying solution thereby keeping it confidential.

Support them to do the mahi with time, space, energy and remuneration of service to a common goal.

Know who they are and get them in straight away, to inform the initial investigations into the biosecurity risk. This may mean that only the people on ground level get the korero, and the information collated by kaitiaki is limited to the results and physical actions taken. So long as it works, you should be okay with whatever information you get. If you are funding it, make sure you are okay with exercising faith, trust and aroha. For the kaitiaki, their mana is on the line if it goes to custard.

understanding the True essence of kaitiakitanga with values of manaakitanga, awhi, tautoko and reviewing mainstream methods instead of being exclusive

Be willing to give up control

Engage with genuine desire to support rangatiratanga (i.e. goal to self-govern and self-manage)

Not sure ... there have already been many uses for indigenous plants and medicines that have been commercialised by others

Have a specific pool of funding for them? Link them with the right people?

Fund them: it's not about the scientists

Find and fund passionate Māori scientists or organisations to partner with.

Intellectual cultural property rights

We respect their wishes, we do not give anything to anyone that came from them as the pukenga or knowledge holder without their permission in advance.

Don't know

Give them the money and let them get on with it ... mātauranga Māori belongs to Māori

Give them a chance to undergo their solution, ask them for a time frame, respect their wishes and let them be until such time frame has expired.

Non-Māori scientists need to pass on to 'Māori scientist groups' first. I have found non-Māori scientists non tangata whenua come and go and have no connection to the areas like tangata whenua whanau have. Māori running Māori Kaupapa-driven projects.

Establish a safe forum/body that facilitates the sharing of mātauranga, and also providing a protection mechanism/process/indigenous IP protocol or forum capable of storing/managing that shared knowledge, that satisfies Māori aspirations.

Provide them with adequate resources

Encourage the use of the solution and give the opportunity to set themselves up as a valid practitioner who are given legal status. Be resourced to carry out the necessary applications for solutions.

Don't use us to tick the science boxes ... can't believe this is still going on 30 years after I started a BSc, MSc, GradDip ... that's after 10 years of nursing Kanohi ki kanohi - Wānanga - make opportunities more widely known - overseas indigenous exchanges - link mentors and mentees in training w mahi in their tūrangawaewae - acknowledge tangata whenua ... don't think of us last ... towards the end of budget allocation THANK YOU FOR ASKING ... MAY ALL THAT IS GOOD LIGHT YOUR WAY

Need to be roles to employ people with this knowledge and skill to bring organisations up to speed culturally ...

Get Māori people involved that understand what the people want

Māori to patent solutions.

Sorry - too big a question to answer this late at night. Information to stay with the hapu, marae.

## Report information sheet

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