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PERSPECTIVES ON
GENETIC
TECHNOLOGIES AND
PEST MANAGEMENT

SURVEY RESULTS

PREPARED BY

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WHAKAMĀTAKI

IN PARTNERSHIP WITH

National
Science
Challenges

NEW ZEALAND'S
BIOLOGICAL
HERITAGE

Ngā Kōiora
Tuku Iho

Genetic Technologies and Pest Management - Executive Summary

Disclaimer: While the executive summary is an accurate overview of the report, we strongly recommend you read the entirety of the report to gain the best possible perspective on the uses of genetic technologies for pest control and environmental protection. We recognise the sensitivity of this topic and, as a result, also acknowledge the potential for individuals to misuse it. We commit to doing what we can to correct any blatant misinformation and disinformation that may come from this report.

Te Tira Whakamātaki (TTW), as part of a project exploring genetic technologies, conducted a survey aimed at gathering Māori and Pākehā sentiments regarding genetic technologies in pest management within the broader context of conservation and environmentalism in Aotearoa New Zealand. Running from July 9th to August 27th, 2023, the survey had 537 respondents. Demographically, 26% of the respondents identified as Māori, while 74% identified as Pākehā (non-Māori), with a predominant representation of women and an average age of 49. Of Māori respondents, 77% indicated that they were actively practicing kaitiakitanga at place (compared to only 58% of Pākehā respondents). Respondents were spread across the country, including good representation major centres like Ōtautahi (Christchurch), Tāmaki Makaurau (Auckland), and Te Whanganui a Tara (Wellington).

Using qualitative and quantitative means, the survey was designed to explore respondents' perspectives on:

- Predator Free 2050 (PF2050) and environmental management.
- General pest control attitudes, influences, and decision making.
- Biosecurity attitudes and behaviours.
- Comfort, influences, and trust with genetic tools and their uses for pest control and environmental protection.

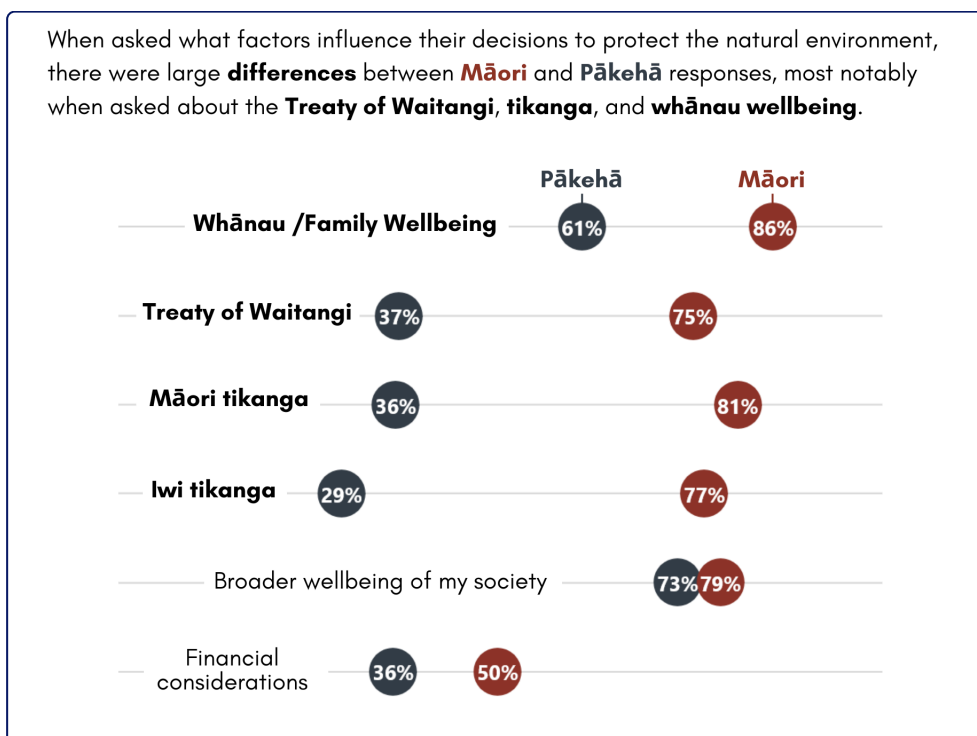
Results showed that the vast majority of Māori and Pākehā respondents had heard of PF2050, but that percentage drastically reduced when asked whether it was achievable (41% of Māori said it was achievable compared to 31% of Pākehā respondents). Although results show that over three quarters of Māori and Pākehā respondents believed that invasive species needed to be eradicated (77% and 79% respectively).

Both Māori and Pākehā respondents demonstrated overwhelming agreement that biosecurity was important to them, and that biosecurity is important to New Zealand's export industry. Further, nearly all respondents agreed that it is important to keep New Zealand free from new pests and diseases, but just over half indicated that they were knowledgeable about biosecurity. This is despite the majority of both Pākehā and Māori agreeing that they had an important role to play stopping organisms from entering the country and halting their spread should they find their way in. Both groups viewed rats, stoats, possums, kauri dieback, myrtle rust, and wild cats as significant threats to Aotearoa's native plants, animals or natural environment. Pigs and deer were not deemed as threatening as the others, but over half of each group still saw them as large or very serious threats.

Results also showed that Māori and Pākehā general attitudes on pest control were similar, with one notable exception; specifically, 83% of Māori believed that Treaty obligations should guide and give effect to decisions about eradicating pests but only 51% of Pākehā respondents thought the same. Additionally, when planning pest control activities, Māori emphasized the wellbeing of native ecosystems first and foremost, while Pākehā prioritised the involvement and income of hau kāinga (people of the marae). Moreover, Māori ranked iwi or hapū entities as their top preference to lead environmental decision-making by a good margin, whereas Pākehā rated the Department of Conservation as their first option and the Ministry for the Environment as a close second (noting that these entities were the second and third choices for Māori respondents as well).

The survey also asked respondents to define what a ‘pest’ is and the results show that it is influenced by cultural, historical, and environmental contexts. Māori respondents emphasised relationships and connections in their responses, while Pākehā respondents often defined a pest from a more biological standpoint. This highlights that different views and approaches to what a pest is are based on the variable experiences and application of mātauranga a-taiao, and environmental knowledge and practices. It is also dependent on individuals’ understanding of Aotearoa New Zealand history, whakapapa, and colonisation. We also asked respondents to rate six factors that could possibly influence environmental decision making. We combined the percentage of Māori and Pākehā respondents who selected a 5, 6, or 7 when rating the factor (indicating a medium to high amount of influence for that factor). There were marked differences between Māori and Pākehā in the following factors:

- Whānau/family wellbeing (86% of Māori respondents vs. 61% of Pākehā respondents)
- Treaty of Waitangi (75% of Māori respondents vs. 37% of Pākehā respondents)
- Māori tikanga (81% of Māori respondents vs 36% of Pākehā respondents)
- Iwi tikanga (77% of Māori respondents vs 29% of Pākehā respondents)



The survey also explored the levels of comfort on using genetic technologies as a way to control pests and protect the environment. In our quantitative analysis of these responses, we found that 44% of Māori respondents indicated that they supported the use of genetic tools in pest management and to protect the environment. This is compared to 55% of Pākehā respondents. In contrast, the number of Māori and Pākehā respondents who did not support the use of genetic technologies were similar (25% and 23% respectively), and 27% of Māori and 22% of Pākehā respondents said that they weren't sure if they supported the use of technologies. When combining this with the percentage of respondents who did not support the use of genetic technology, the percentages are nearly split down the middle (50/50), with Māori less likely to support their use (a combined 56% either against or unsure) when compared to Pākehā (a combined 45%).

A large portion of both Māori and Pākehā respondents supported the use of genetic technologies because they saw it was the best chance to protect taonga species. It's important to note that many of these respondents were not completely comfortable with the tools but that they did see it as the best way to manage pests and protect the environment. Māori respondents in this category see the use genetic technologies leading to better protection of taonga species as well as better social and cultural outcomes. Pākehā responses also thought it was the best way to protect taonga species but commenting more on the cost-effectiveness and the specificity to a pest. Many respondents indicated that their support for these technologies would only be there if it could be proven to be completely safe to use and that strict regulations were in place to prevent any unintended consequences or misuse. Another condition of support, that was only given by only Māori respondents, was that any such tools need to give effect to Te Ao Māori, and that hāpori need to be at the decision-making table. Some Māori and Pākehā respondents expressed their support for genetic technologies because they viewed it as a more 'ethical' or 'humane' way to manage pests compared to other methods like poison and trapping. Others also mentioned they supported such 'humane' technologies because they reduce potential harm to the environment or non-targeted species.

On the other hand, there were a large number of Māori and Pākehā respondents who were opposed to the use of genetic technologies. Many of these respondents were uncomfortable because they believed the technologies came with uncertainties, unforeseen consequences, and were hard to control once they were 'out there'. Little differences existed between Māori and Pākehā respondents in this theme. Other reasons for not supporting the use of genetic tools included not wanting to interfere with the 'natural order of things', wanting a more hands-off approach, and a wish to use existing or traditional pest control methods (e.g., hunting and trapping).

There were a large portion of Māori and Pākehā respondents who felt they were not informed enough about the topic to decide to support or disagree with the use of genetic technologies. This evidence suggests that there is not enough information available to the public to enable them to make an informed decision. Supporting this, we asked about comfortability with specific genetic technologies. In general, Māori generally expressing less comfort than Pākehā, particularly with genetic editing. Both groups exhibited a lack of knowledge, reflected in high percentages choosing 'I don't know,' underscoring the need for targeted educational initiatives.

When asked who they would trust most to give them information about a potential genetic technology tool, both Māori and Pākehā trusted scientists the most (82% Pākehā, 73% Māori). However, Māori expressed higher trust in Iwi leaders or authorities (70%) compared to Pākehā (46%).

In conclusion, this survey provided detailed insights into the nuanced perspectives of Māori and Pākehā respondents regarding genetic technologies in pest management. It shed light on the complexities surrounding the acceptance of genetic technologies for pest control as, while there was a split between supporters and opponents, a substantial number of respondents expressed uncertainty. The findings underscore the importance of recognising cultural and historical factors in shaping attitudes towards pest management and genetic technologies. Additionally, they stress the need for inclusive decision-making processes that consider diverse perspectives, cultural values, and historical contexts, particularly in the realm of genetic technologies, environmental protection, and associated pest management.

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Genetic Technologies and Pest Management - Survey Results

Introduction

Pest management remains one of the primary discussions within conservation and environmentalist circles in Aotearoa – New Zealand. Conversations about best practices in pest management, new tools necessary, and the potential for using genetic technologies to rid the country of pests have increased and we believe it is important to gauge the level of interest and comfortability of Māori and non-Māori to help inform our positions. Therefore, we (Te Tira Whakamātaki [TTW]) recently published a short online survey that built on the results of one done in 2018 by researchers at Lincoln University. The purpose of this survey was to explore the public's attitudes and knowledge of biosecurity, environmental behaviours, and comfort with various genetic tools in pest management. Another purpose was to compare responses between Māori and Pākehā to assess whether differences existed between the groups that would affect how we talk about, think, and act in this space. The results from this report are an output of other work that TTW is involved in, funded by the Biological Heritage National Science Challenge.

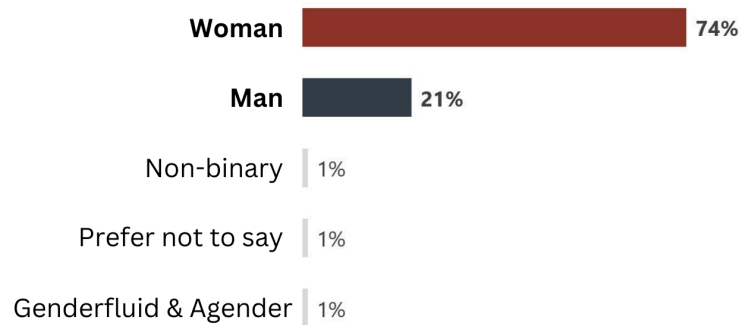
The survey was published using SurveyMonkey and was open from July 9th – August 27th, 2023. TTW paid for an advertisement on Facebook to recruit respondents. It was also sent through TTW's newsletter and shared on Twitter. Lastly, it was sent to TTW biosecurity networks and they were asked to spread the link (i.e., snowball method). Anyone who lived in Aotearoa - New Zealand was eligible to participate. In the end, the survey received 537 responses. An incentive draw for one of three \$250 gift cards to New World was used to help boost participation. For additional information and to view a list of the questions, please contact micheal@ttw.nz.

Who Answered the Survey?

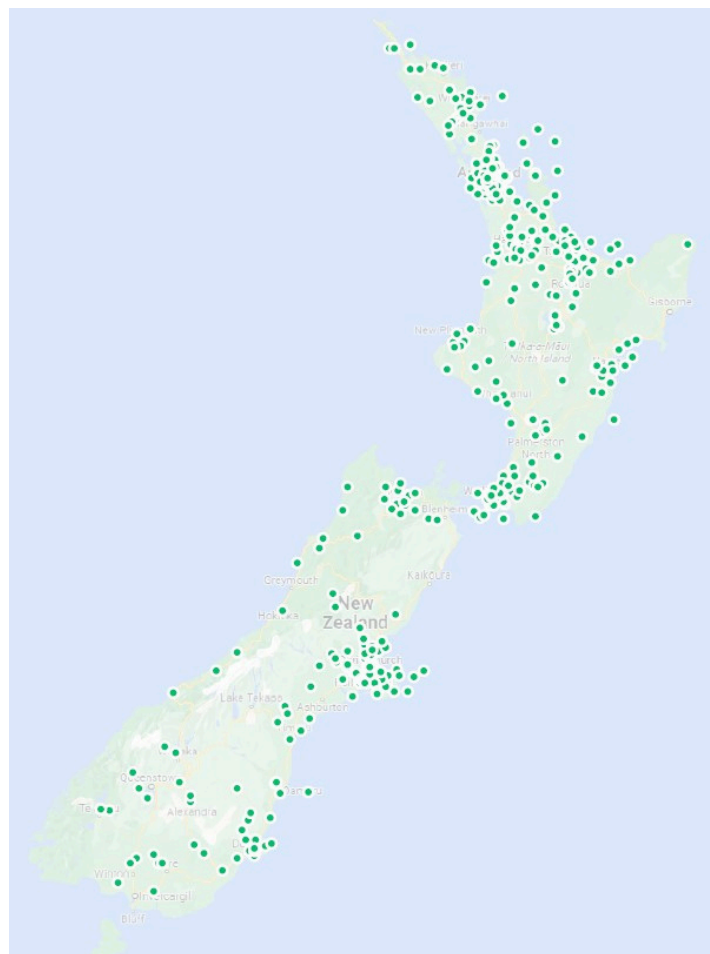
To help us provide context and meaning to the survey results, we asked a short series of demographic questions of respondents. We believe it is important to state these for the reader so they may also put the results into context.

To begin, 26% of the respondents self-identified as Māori and the remainder self-identified as non-Māori (74%; referred to as Pākehā in this report). This is comparable to [StatsNZ's estimate of the population of Māori](#) in Aotearoa in the middle of 2022 (17.4%). As an entire sample, most respondents self-identified as a woman (74%) with the remaining majority identifying as a man (21%). It's important to note that approximately 3% of respondents self-identified as non-binary, genderfluid, agender, or preferred not to say.

The majority of respondents self-identified as a **woman** or as a **man**.

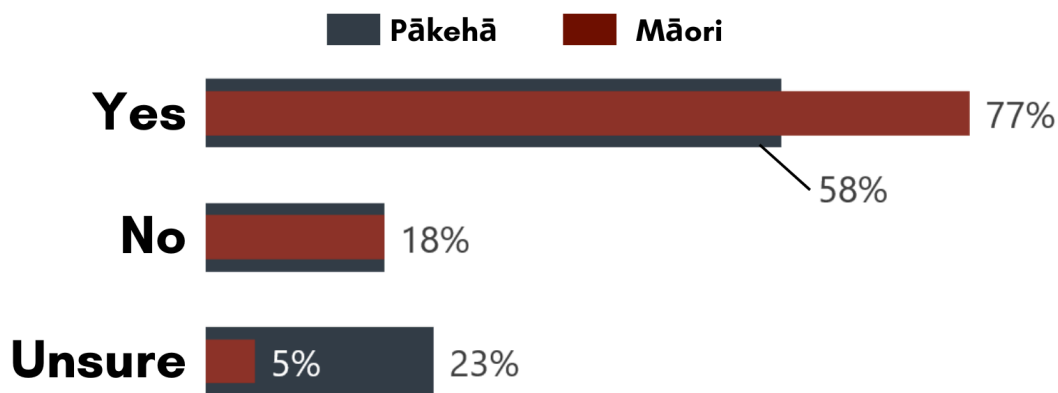


The average age of all respondents was 49 and ranged from 19 to 83. When separating groups, the average age of Māori respondents was 46 (ranging from 21 to 74) and the Pākehā average was 50 (ranging from 19 to 83). We also asked respondents to identify where they usually lived within Aotearoa using a map to ensure the sample of respondents was spread throughout the country. At a glance, it appears respondents came from all over the country, with predictable clusters in major centres such as Ōtautahi (Christchurch), Tāmaki Makaurau (Auckland), and Te Whanganui a Tara (Wellington). For the reader's clarity, each green dot represents a single respondent.



To understand the current level of biodiversity work occurring, we also asked whether respondents were actively practicing kaitiakitanga at place. Reflected in the graph below, more Māori indicated that they were practicing kaitiakitanga at place (77% said yes compared to 58% of Pākehā respondents). It is possible, however, that Pākehā respondents didn't fully understand the meaning of kaitiakitanga or did not feel comfortable indicating that they were because there was a much higher proportion answering 'unsure' when compared to Māori respondents.

More **Māori** than **Pākehā** indicated that they were **actively practicing kaitiakitanga at place**, but a much higher amount of **Pākehā** were **unsure**.



Understanding of PF2050 & Pest Control Attitudes

At the broadest level, we asked respondents whether they have heard of the New Zealand Government initiative to rid the country of predators – Predator Free 2050 (PF2050). Considering the sweeping nature of marketing for PF2050, which has done a good job at highlighting its positive efforts to the public, it's unsurprising that many Māori and Pākehā respondents had heard of PF2050 (84% and 87% said yes, respectively).

Many Māori respondents **have heard of** Predator Free 2050.

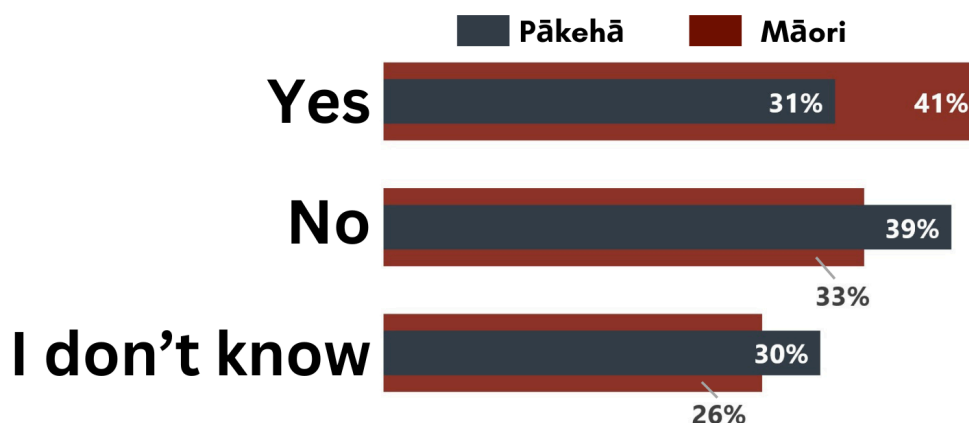


Many Pākehā respondents **had heard of** Predator Free 2050.



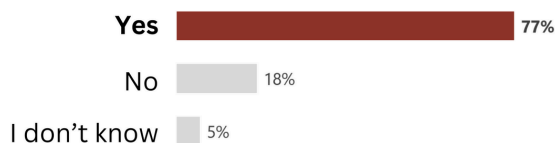
Next, we asked whether respondents believed that PF2050 was achievable given its massive scope and time frame. As is seen below, more Māori respondents answered 'yes' when compared to Pākehā respondents, but that number was still well under half of all respondents (41% for Māori and 31% for Pākehā). On the other hand, more Pākehā did not think PF2050 was achievable when compared to Māori and a significant amount of people (a quarter to nearly one third) did not know if it was achievable or not.

More **Māori** than **Pākehā** thought that PF2050 was achievable, but overall many said **no** or that they **didn't know**.

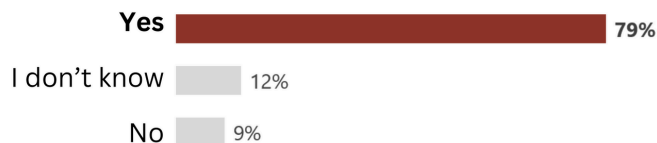


Despite the uncertainty as to whether PF2050 is achievable, the over three quarters of Māori (77%) and Pākehā (79%) respondents believed that Aotearoa – New Zealand should eradicate invasive species.

Just over **three quarters** of Māori respondents thought we **should eradicate invasive species**.



Just over **three quarters** of Pākehā respondents thought we **should eradicate invasive species**.

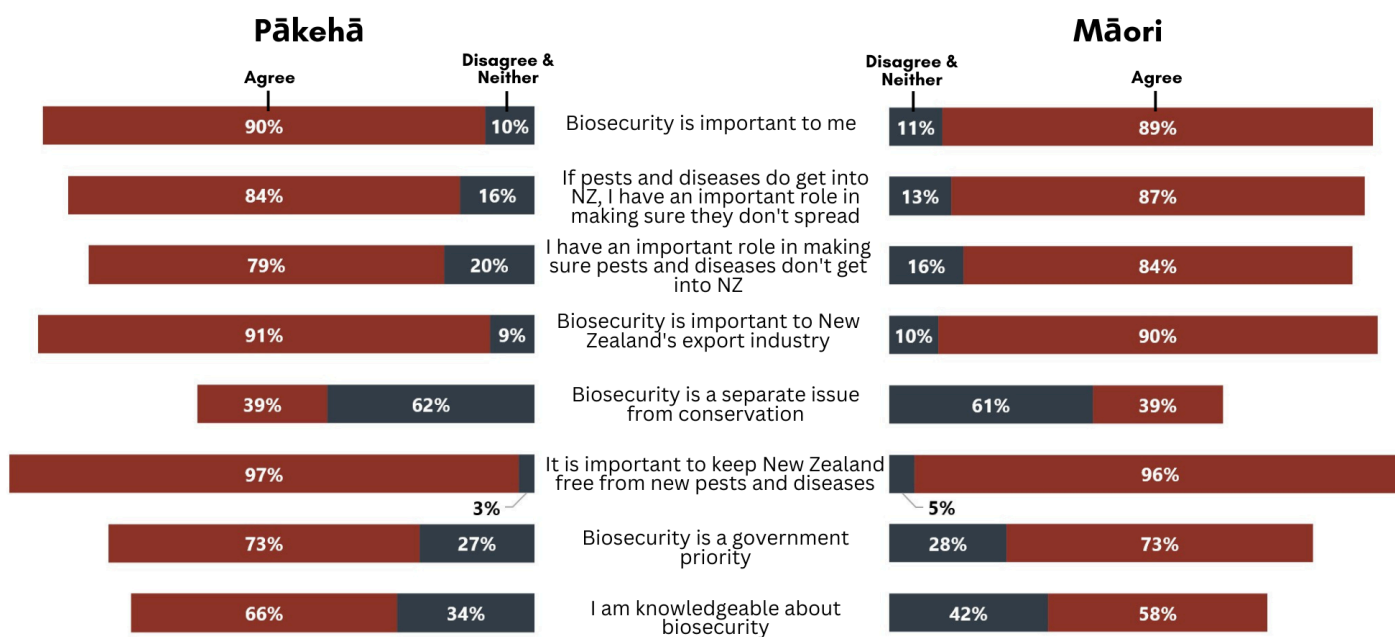


Biosecurity Attitudes and Behaviours

To help us understand respondents' general understandings and attitudes towards biosecurity in Aotearoa, we presented them with a series of statements and asked them how much they agreed with each one. These statements were about biosecurity in Aotearoa - New Zealand and about individual attitudes toward biosecurity in general (e.g., biosecurity is important to me). A scale from 1 (strongly disagree) to 5 (strongly agree) was used to gather results. In the graph below, which combines percentages of agree and strongly agree together for readability, the percentages between the two groups were nearly identical and leaned heavily towards the 'agree' side. For example, 90% of Pākehā and 89% of Māori respondents agreed that biosecurity

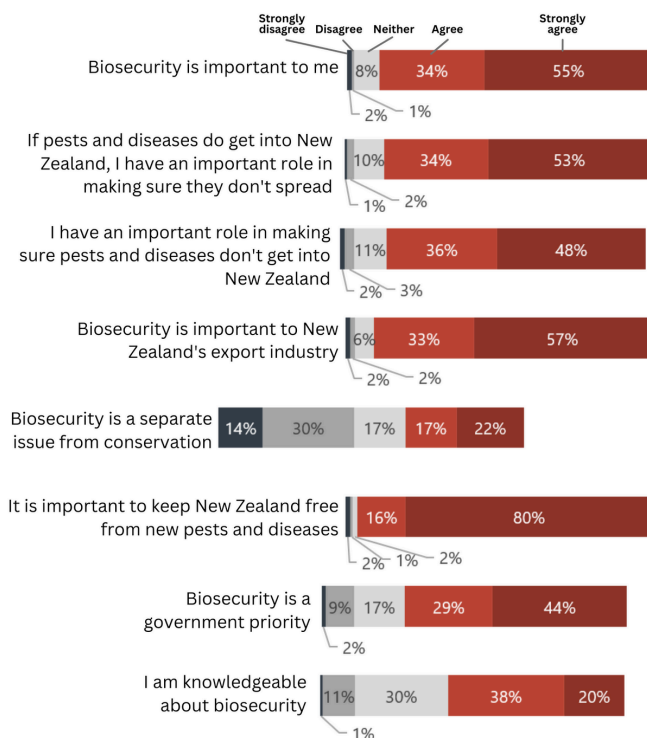
was important to them and 91% and 90% (respectively) agreed that biosecurity is important to New Zealand's export industry. Further, 97% of Pākehā and 96% of Māori respondents agreed that it is important to keep New Zealand free from new pests and diseases, but only 66% and 58% respectively agreed that they were knowledgeable about biosecurity. This is despite the majority of both Pākehā and Māori agreeing that they had an important role to play stopping organisms from entering the country and stopping the spread of them should they find their way in. Over half of the Pākehā and Māori sample selected neither, disagree, or strongly disagree when presented with the statement that biosecurity is a separate issue from conservation (note that this was an intentionally reversed item in our survey).

Māori and Pākehā respondents were quite close in their responses to general biosecurity attitudes and knowledge.



For interested readers, the separated and detailed percentages for these statements are below. These give a better idea of the percentages of respondents who selected 'agree' vs 'strongly agree', therefore providing additional nuance to the results.

The vast majority of Māori respondents either **agreed** or **strongly agreed** on the importance of biosecurity, confirmed that they have a role within that system, and that it is a priority for the Nation (on a governmental and economic level).



The vast majority of Pākehā respondents either **agreed** or **strongly agreed** on the importance of biosecurity, confirmed that they have a role within that system, and that it is a priority for the Nation (on a governmental and economic level).

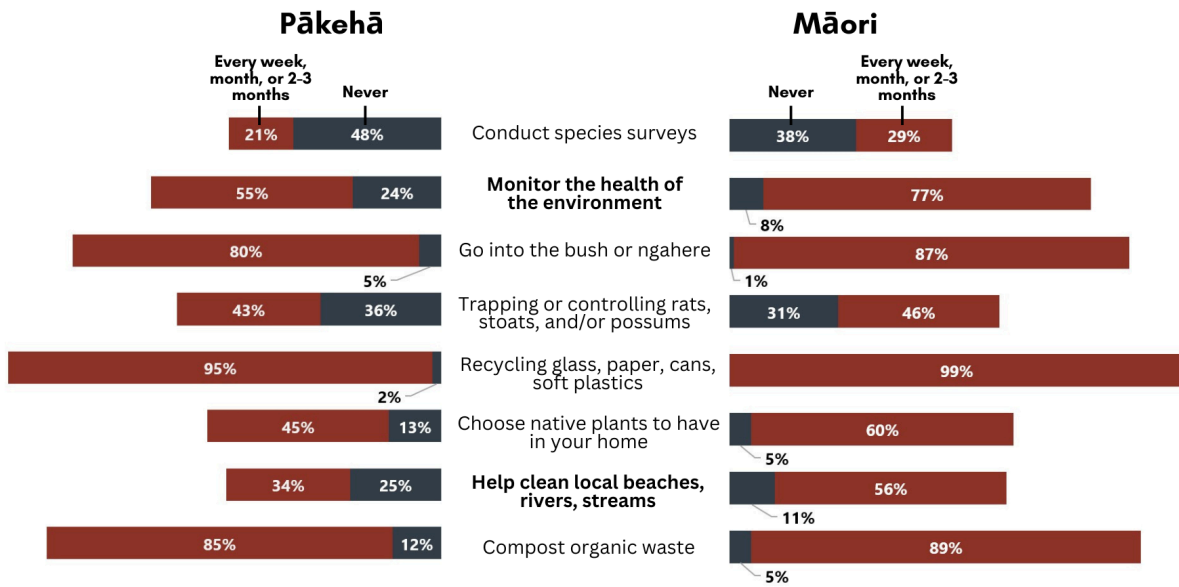


To further this set of findings, we asked respondents about their behaviours related to biosecurity and environmentalism. These ranged from everyday acts like recycling, pest control, composting, all the way to conducting species surveys. To indicate how often they engaged in a particular behaviour, respondents used the following options:

- 1 – Never
- 2 – Every week
- 3 – About once a month
- 4 – Every 2-3 months
- 5 – about once a year

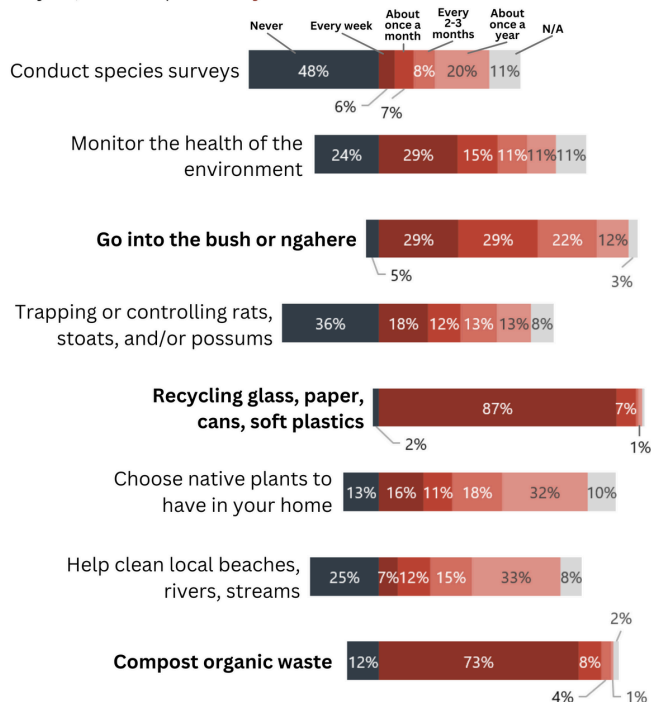
The goal here was to determine if there were any differences between the actions of Māori and Pākehā respondents. As is seen in the graph below (which combines the percentage of respondents who selected every week, month, or 2-3 months for a behaviour and compares that with the percentage who selected never) evidence suggests that Māori respondents were more likely to monitor the health of the environment (77% vs 55% of Pākehā respondents) and to help clean local beaches, rivers, and streams (56% vs 34% of Pākehā respondents). The remainder of biosecurity and environmental behaviours had comparable percentages between the two groups.

When comparing the two, **Māori** respondents tended to **monitor the health of the environment** and help **clean local beaches, rivers, and streams more often**. The remaining factors gauging activity were relatively comparable.

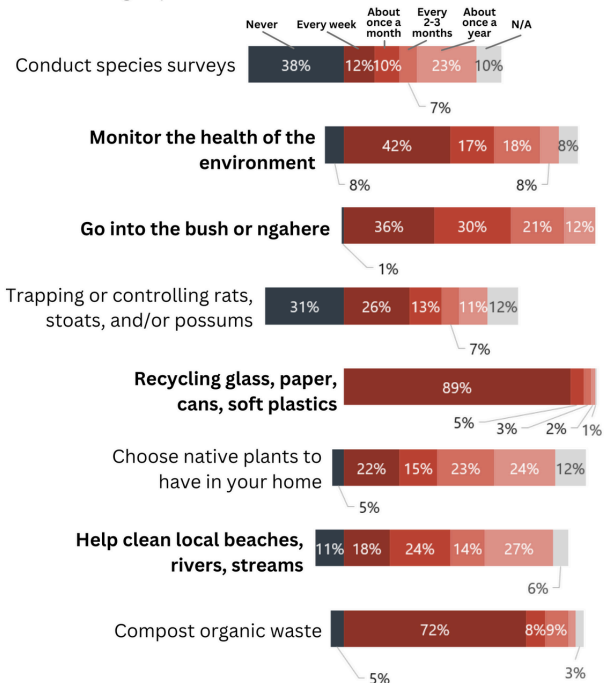


As respondents who selected about once per year and N/A are not represented in the graph above, the detailed graphs for both Pākehā and Māori respondents are below. This gives the reader a more complete picture of self-reported behaviours and provides additional context to the comparison above.

Many Pākehā respondents indicated that they go into the bush/ngahere, recycle, and compost **every week**.



Many Māori respondents indicated that they **monitor the health of the environment**, go into the **ngahere**, **recycle**, and **compost every week**. Only 31% indicated that they never did any trapping or controlling of pests.



Pest Control Attitudes, Influences, and Decision Making

In Aotearoa, New Zealand, the word ‘pest’ is predominantly used to refer to species such as possums, stoats, and rats. While these three undoubtedly cause massive damage to native birds and flora. However, to further explore this narrative we asked respondents to define what a pest was in an open-ended question*. The question was deliberately left broad so that respondents were not swayed to respond with specific species. We went through each response and categorised how ‘pests’ were being referred to. As is seen in the table below, there were not many significant differences between Māori and Pākehā respondents. The only noticeable differences were that 34% of Pākehā respondents mentioned in that a pest can be an animal in their response (compared to only 23% of Māori) and that 55% of Māori wrote that pests have a negative impact on te taiao (compared to 46% of Pākehā respondents). Finally, 18% of Pākehā indicated that pests are unwanted or are a nuisance compared to only 7% of Māori. The remaining results are presented in the table below.

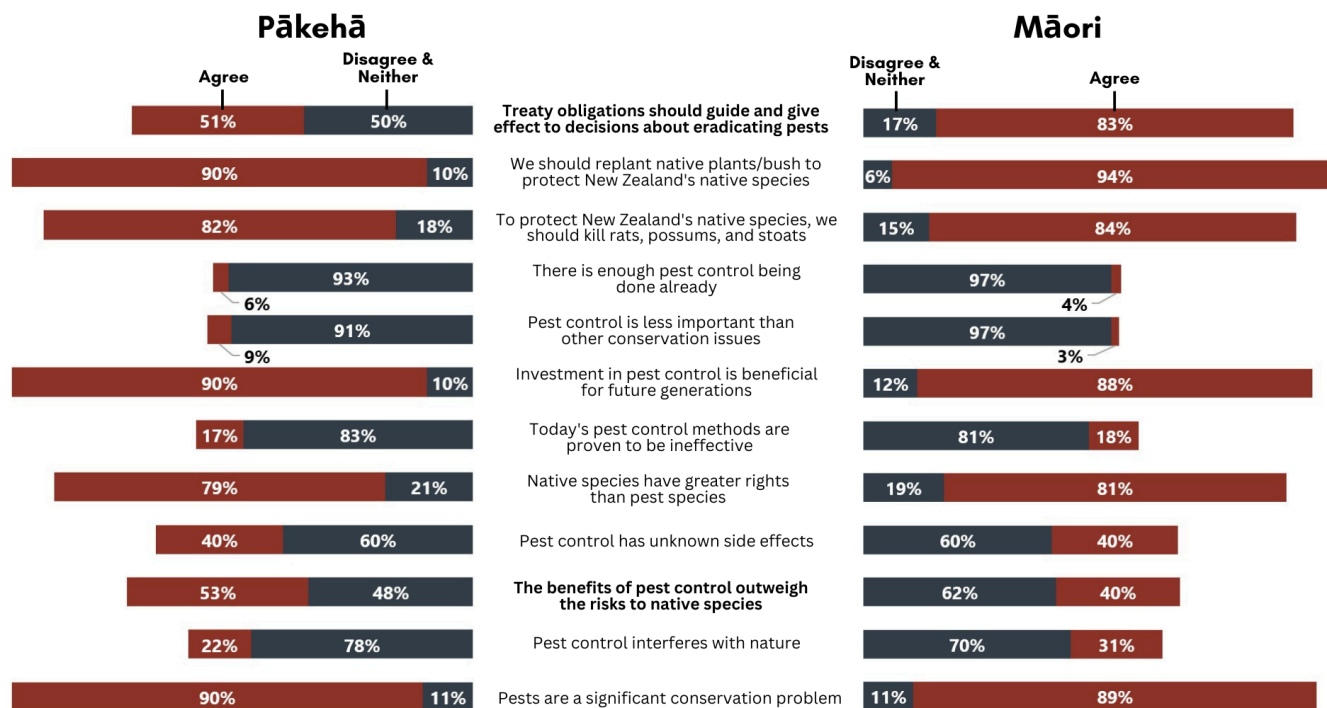
Pest Definition	Percentage of Māori Respondents	Percentage of Pākehā Respondents
Invasive or introduced	35%	39%
Unwanted or a nuisance	7%	18%
Is an animal	23%	34%
Is a plant	13%	19%
Is a microbe or a disease	2%	6%
Has a negative impact on te taiao (generally)	55%	46%
Has a negative impact on industry	11%	11%
Has a negative impact on human activity and health	10%	9%
Has a negative impact on Māori values	5%	2%
Has a negative impact on animals	26%	21%
Has a negative impact on plants	23%	17%
Has a negative impact on ‘wanted’ species	0%	2%

We also ran a word analysis to compare Māori and Pākehā responses and, while there were certain common words like flora and fauna, there were also subtle differences in how words were described. In the word clouds below, you can see that by dividing Māori and Pākehā responses, the word ‘native’, ‘introduced’, ‘flora’, ‘impact’, and ‘environment’ are most noticeable

*The question was, “from your perspective, how would you define what a pest is”?

eradicating pests. As is seen below, 83% of Māori respondents either agreed or strongly agreed with this statement but only 51% of Pākehā respondents did the same. In contrast, only 40% of Māori respondents agreed that the benefits of pest control outweigh the risks to native species, whereas 53% of Pākehā respondents agreed. However, both groups disagreed that enough pest control was being done already (93% Pākehā; 97% Māori disagreed with that statement), and that pest control is less important than other conservation issues (91% of Pākehā; 97% of Māori disagreed with that statement). In contrast, both did agree that investment in pest control is beneficial for future generations (90% of Pākehā; 88% of Māori) and that we should replant native plants/bush to protect New Zealand’s native species (90% of Pākehā; 94% of Māori).

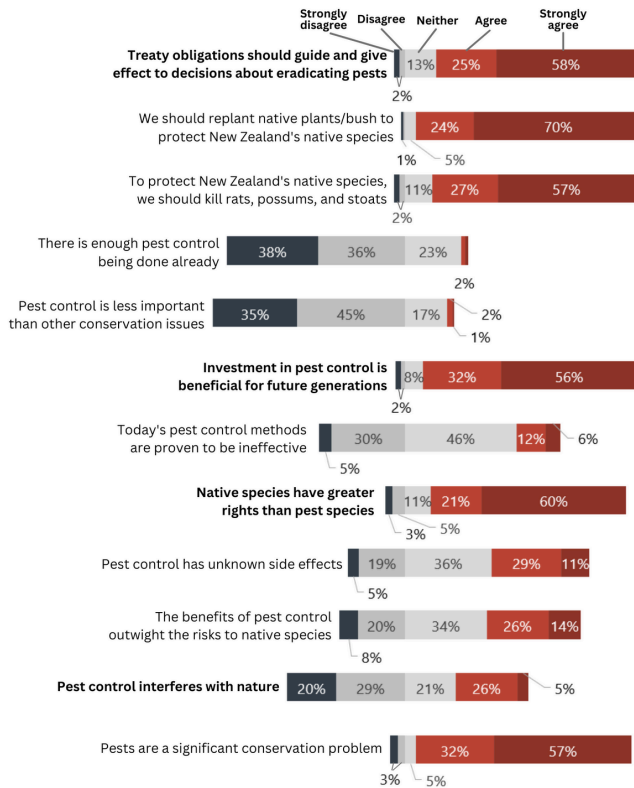
The two groups’ general attitudes on pest control were close to **identical**, with the strong exception of having **Treaty obligations guide and give effect to decisions about eradicating pests**, where **Māori** were far more likely to **agree that it was important**.



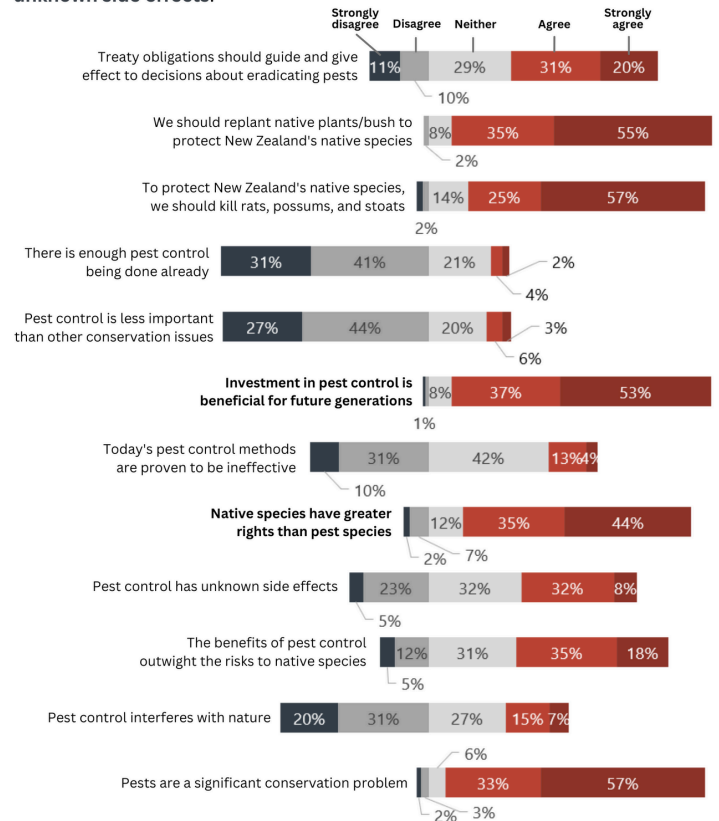
To explore these results further, it is easiest to look at the breakdown of Pākehā and Māori responses. Supporting the statements above, 58% of Māori respondents strongly agreed that Treaty obligations should guide and give effect to decisions about eradicating pests whereas only 20% of Pākehā respondents selected the same. In contrast, only 4% of Māori strongly disagreed or disagreed with that statement (2% respectively) whereas 21% of Pākehā respondents disagreed (11% strongly disagreed and a further 10% disagreed). It’s important to note that 29% of Pākehā selected ‘neither’ for this statement, generally indicating that they weren’t sure what this meant in this specific context (compared to 13% of Māori respondents). Although it is a smaller difference, when weighing agreement to the statement ‘the benefits of pest control outweigh the risks to native species’ it is evident that more Māori strongly

disagreed (8%) or disagreed (20%) with that statement compared to Pākehā respondents (5% and 12% respectively) – a combined 28% vs 17%. Further percentage breakdowns can be seen below.

The majority of Māori respondents **agreed** or **strongly agreed** that Treaty obligations should guide and give effect to pest management, that investment in pest control is beneficial for future generations, and that that native species have greater rights than pests. There was **less agreement** on whether pest control interferes with nature.

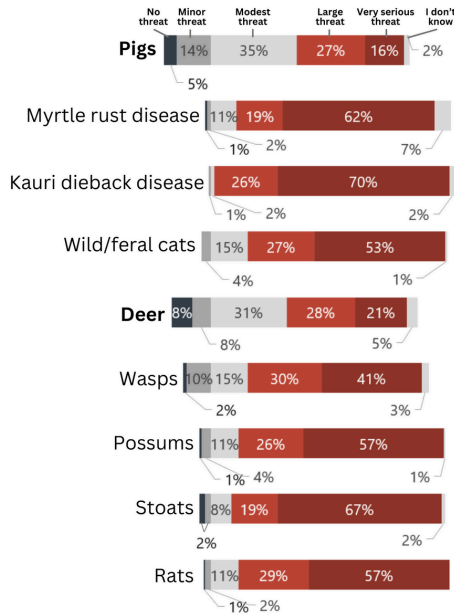


Among others, the majority of Pākehā respondents **agreed** or **strongly agreed** that investment in pest control is beneficial for future generations and that that native species have greater rights than pests. There was **less agreement** on whether pest control interferes with nature or if it has unknown side effects.

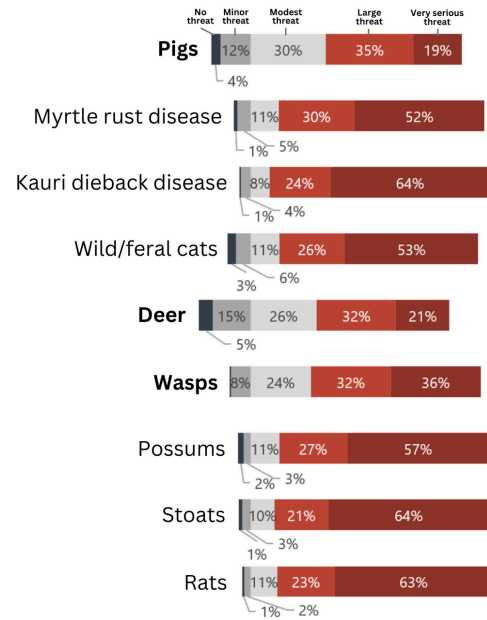


To explore which types of invasive species respondents believed to be the most serious threat, we presented them with a list of nine potential pests and asked them to rate each on a scale from 1 (no threat at all) to 5 (a very serious threat). Except for pigs and deer, many from both groups viewed the remaining pests as either a large or very serious threat to Aotearoa's native plants, animals, and natural environment. Considering the branding and messaging around PF2050, it's perhaps unsurprising that rats, stoats, and possums were among the most likely to be considered a very serious threat. However, both groups also deemed kauri dieback, myrtle rust, and wild cats as a very serious threat. This is an indication that the respondents have broad view of what a pest could be and the threat it may pose to endemic species and organisms.

With the exception of **pigs** and **deer**, the majority of Māori respondents indicated that our list of pests and diseases posed a **large or very serious threat** to Aotearoa's native plants, animals, and natural environment.

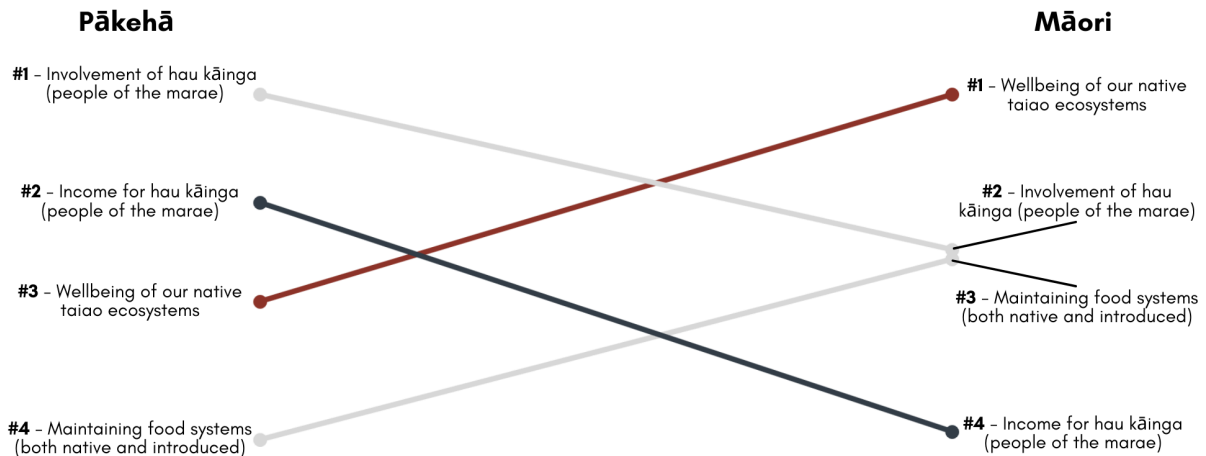


With the exception of **pigs** and **deer**, the majority of Pākehā respondents indicated that our list of pests and diseases posed a **large or very serious threat** to Aotearoa's native plants, animals, and natural environment.



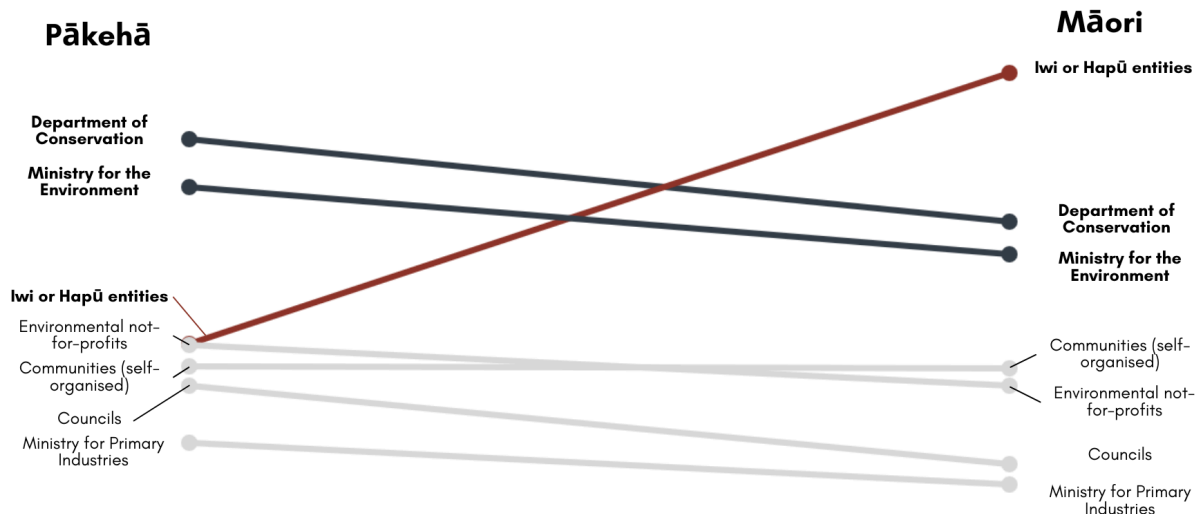
To help us better understand the factors that Pākehā and Māori respondents consider when making decisions about pest management and control activities, we presented four common considerations and had respondents rate them from the most to least important. The most noticeable difference between the two groups was that Māori had the wellbeing of native taiao ecosystems as the most important factor to consider (on average), whereas Pākehā respondents rated that third. For Pākehā respondents, the involvement of hau kāinga (people of the marae) was the most important (it was rated as second most important for Māori respondents). Additionally, the second most important factor for Pākehā was income for hau kāinga, whereas Māori respondents rated that as the least important factor when planning pest control activities.

There were **differences** between **Māori** and **Pākehā** when asked to prioritize what is most important when planning pest control. Most notably, the **wellbeing of native taiao ecosystems** was the most important to Māori, but third for Pākehā respondents. **Income for the hau kāinga** was second for Pākehā but last for Māori respondents.



Finally, we asked respondents who should be leading environmental decision making in Aotearoa. To do this, we provided a list of seven entities and asked respondents to rank them from 1 to 7 (with #1 being the preferred decision-making body). The sole major difference between the two groups was that Māori ranked iwi or hapū entities as their top preference to lead environmental decision-making by a good margin, whereas Pākehā rated the Department of Conservation as their first option and the Ministry for the Environment as a close second (noting that these entities were the second and third choices for Māori respondents as well). The remainder of the options fell towards the bottom of the list and there weren't many differences between groups. Councils and the Ministry for Primary Industries were at the bottom of both groups' lists.

When asked who should **lead environmental decision-making**, the **Department of Conservation, Ministry for the Environment, and Iwi or Hapū entities** were in the top three for both Māori and Pākehā. However, Māori put Iwi or Hapū entities as the **first** body who should lead, whereas Pākehā put them as **third**.

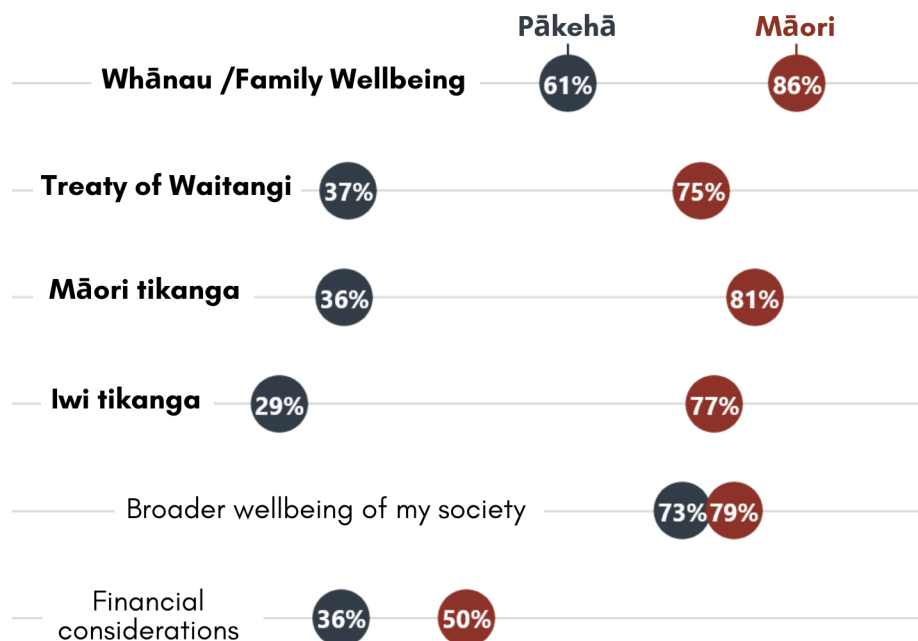


Additionally, we asked respondents to rate six factors that could possibly influence environmental decision making (on a scale from 1 – no influence at all to 7 – completely influences). Doing so can help explore the motivations behind some of the results we have already outline and perhaps provide avenues for how to effectively communicate with groups about pest management and genetic tools. Below is a graph where we combined the percentage of Māori and Pākehā respondents who selected a 5, 6, or 7 when rating the factor (indicating a medium to high amount of influence for that factor). There were marked differences between Māori and Pākehā in the following factors:

- Whānau/family wellbeing (86% of Māori respondents vs. 61% of Pākehā respondents)
- Treaty of Waitangi (75% of Māori respondents vs. 37% of Pākehā respondents)
- Māori tikanga (81% of Māori respondents vs 36% of Pākehā respondents)
- Iwi tikanga (77% of Māori respondents vs 29% of Pākehā respondents)

Interestingly, the percentage of Māori and Pākehā respondents were similar for the factor 'broader wellbeing of my society' (79% and 73% respectively).

When asked what factors influence their decisions to protect the natural environment, there were large **differences** between **Māori** and **Pākehā** responses, most notably when asked about the **Treaty of Waitangi, tikanga**, and **whānau wellbeing**.



Genetic Tools & Pest Control – Comfort, Influences, and Trust

To begin exploring perspectives and comfort on using of genetic technologies we posed this open-ended question to respondents:

What is your opinion on using genetic technologies as a way to control pests and protect the environment? In your answer, please explain the reasons why you do or do not support the use of genetic technologies.

We received 458 responses to this question and analysed Māori and Pākehā responses separately for comparison purposes. Perhaps unsurprisingly given the topic, both Māori and Pākehā perspectives were relatively split between being supportive of the use of genetic tools in pest management and environmental protection and being against it. There were also many respondents who did not give a perspective for or against because they were too unfamiliar with genetic tools or wanted additional research on them, a finding that is supported throughout this report. In our quantitative analysis of these responses, we found that 44% of Māori respondents indicated that they supported the use of genetic tools in pest management and to protect the environment. This is compared to 55% of Pākehā respondents. In contrast, the number of Māori and Pākehā respondents who did not support the use of genetic technologies were similar (25% and 23% respectively), and 27% of Māori and 22% of Pākehā

respondents said that they weren't sure if they supported the use of technologies. When combining this with the percentage of respondents who did not support the use of genetic technology, the percentages are nearly split down the middle (50/50), with Māori less likely to support their use (a combined 56% either against or unsure) when compared to Pākehā (a combined 45%).

When looking at the responses themselves, there was a good portion of both Māori and Pākehā respondents who were supportive of the use of genetic technologies because they saw it was the best chance to protect taonga species. It's important to note that many of these respondents were not completely comfortable with the tools but that they did see it as the best way to manage pests and protect the environment. In other words, they saw it as a tool for the greater good that could lead to the outcomes, they desired and saw it to 'get the job done'. Māori respondents in this category explained their support for tools because they saw it leading to better protection of taonga species as well as better social and cultural outcomes. Pākehā responses also thought it was the best way to protect taonga species but explained it by commenting on the cost-effectiveness of it and pointed to it as a targeted solution to pest management. For example:

"Yes if it is the best option of protecting taonga species. Taonga species have whakapapa to Aotearoa and tangata whenua have whakapapa to taonga species...a continuing loss of taonga poses serious threats to the identities of tangata whenua/iwi/hapū as much of our identity is derived and learnt from te taiao and many species. Further loss will have implications on our knowledge systems." – **Māori Respondent**

"I'm on the fence here a bit - but I guess where it is the only alternative to ensure survival of a native species or is important to our biodiversity, I would be in favour." – **Māori Respondent**

"If we could eradicate rats, stoats, and possums this way without risk to other species I would be totally in favour. I want my tamariki to hear the dawn chorus and have heard it increase as a result of pest control in our area." – **Māori Respondent**

"I don't believe we will get to PF2050 without the use of genetic technologies, and business as usual will result in further extinction of taonga species and ngahere collapse." – **Māori Respondent**

"I do support genetic technologies for pest control with sufficient controls. Because current pest control methods are not sufficient to achieve PF2050. Gene drives are also a humane, and targeted method of pest control." – **Pākehā Respondent**

“I am for it, as I think long term it could be the only viable solution to managing introduced pest species in NZ (with the least amount of suffering to animals, more humane i.e. creating infertile populations rather than using poison). Also could be the most cost effective and the only option for eradication.” – **Pākehā Respondent**

“I believe that proper use of genetic technology is the only way to make NZ predator free, as ongoing costs of all others are non-sustainable, so strongly support its use.” – **Pākehā Respondent**

“Genetic technologies are the next phase of innovation in pest control. When done ethically and with safety in mind to ensure there are no off-target effects that outweigh the desired outcome, gene editing is a game changer.” – **Pākehā Respondent**

Expanding on this theme, some Māori and Pākehā respondents expressed their support for genetic technologies because they saw it as a more ‘ethical’ or ‘humane’ way to manage pests compared to other methods like poison and trapping. Others explained that, because it doesn’t use poisons, they supported gene technologies because they saw it as more of a ‘humane’ solution that reduces potential harm to the environment or non-targeted species. It is likely that recent anti 1080 campaigns* have influenced this theme ([this Australian Facebook page](#), for example, is still actively posting and has 16K followers:

“Do support. I think genetic technologies can be more effective and less distressing to the individuals than traditional pest control methods.” – **Māori Respondent**

“I support these techniques because I think they have the potential to be the most humane option for pest eradication. I think the word ‘pest’ has a lot of negative connotations associated with it, and it’s true that pests have caused some serious damage, however I think sometimes the wellbeing of these pests (or the acknowledgement of these pests being unique in their own right) is forgotten. I think all life deserves respect which is the main reason I would support the use of genetic technologies - if it is able to be done with consideration to the life of these pests and humanely.” – **Māori Respondent**

“Genetic technology offers a more targeted and precise approach to pest control. Traditional methods often involve the use of chemical pesticides, which can have negative effects on the environment and non-target organisms. In contrast, genetic technology allows for the development of specific traits in pests that can reduce their ability to reproduce or survive, without harming other organisms. This approach has the potential to significantly reduce the use of chemical pesticides and their associated environmental risks.” – **Pākehā Respondent**

*Also see: <https://www.rnz.co.nz/national/programmes/mediawatch/audio/2018663379/1080-campaign-turns-toxic>;
<https://www.newshub.co.nz/home/rural/2018/09/1080-works-but-there-s-no-arguing-with-anti-1080-activists-expert.html>;

“I do support it as it seems much more humane than killing them outright.” – **Pākehā Respondent**

“I support genetic technologies as I believe they are far more humane than poison or hunting. Just because an animal is labelled a “pest” does not mean we should enable cruelty...” - **Pākehā Respondent**

“I do support the use of genetic technologies. It opens many possibilities for pest control that would mean reduced pesticide/poison use. There is so much research and tech available from around the world now for genetic technologies and I think NZ pest control would benefit so much from it. I think that it's important that this technology becomes destigmatised.” – **Pākehā Respondent**

It was quite common, however, for both Māori and Pākehā respondents to describe several key conditions of their support of the use of genetic technologies. Many respondents indicated that their support for these technologies would only be there if it could be proven that it was completely safe to use and that strict regulations were in place to prevent any unintended consequences or misuse. For example:

“Genetic technologies offer a promising tool for controlling pests and protecting the environment. With research, mature regulation, and responsible deployment, it has the potential to revolutionise pest management practices and contribute to the preservation of biodiversity and ecosystem health. Genetic tech can provide an alternative to the overuse of pesticides, which can lead to the development of pesticide-resistant pests and pose risks to human health and the environment.” – **Māori Respondent**

“To protect our native indigenous species and kai I don't oppose genetic technology as long as there are appropriate safety measures with it.” – **Māori Respondent**

“I support the use of genetic technologies provide the right measure are in place. It will be an effective way to decrease populations faster.” – **Māori Respondent**

“I support it if it is well researched, tested and done in a safe way that will not affect or have unintended consequences for people, their pets, or endemic animals. I believe this is only way to effectively eradicate predators and in turn protect the taiao and its biodiversity.” – **Māori Respondent**

“I do support using genetic technology because it could help eliminate pests when other methods seem to fail so long as it is vigorously controlled.” – **Pākehā Respondent**

“The approach needs to be cautious and measured to make sure no unintended cross transmission, or other risks occur. But if it can be controlled it will be a crucial part of reaching the predator free goal.” – **Pākehā Respondent**

“As long as there is strong evidence that the genetic changes implemented cannot be passed to another species, I have no problem with it.” – **Pākehā Respondent**

Another condition of support, that was only given by only Māori respondents, was that any such tools need to give effect to Te Ao Māori, and that hapori need to be at the decision-making table. In other words, genetic tools and their subsequent use must act in the best interests of Māori communities and according to tikanga:

“Tikanga Māori is important as a guide for new technologies.” – **Māori Respondent**

“I support genetic technologies if the kaupapa is led by Māori. Sometimes Māori are left out of the conversation and at times Māori are the most affected. Genetic technologies aren’t new and has been used by iwi and hapū for food for example. But this was decided by them so the use of genetic practices should also be decided by Māori.” – **Māori Respondent**

“I think it is important to start the conversation about their use, and I do support this approach being used if it is found to be effective, and decision making is done in partnership with iwi and communities, especially in large areas of bush (eg Te Urewera). I also support this approach if there is engagement done with Aboriginal mobs about using it for possum control.” – **Māori Respondent**

“I think they are an exciting space to explore that show potential. however, a lot more work needs to be done such as ensuring things are in place for considerations of rangatiratanga, tikanga, and mātauranga throughout the whole process.” – **Māori Respondent**

On the other hand, there were a large number of Māori and Pākehā respondents who were opposed to the use of genetic technologies. Many of these respondents were uncomfortable because they believed the technologies came with uncertainties, unforeseen consequences, and were hard to control once they were ‘out there’. Little differences existed between Māori and Pākehā respondents in this theme:

“I don't support genetic modification technology of any description in any form especially when the tech is released into the general environment as it could have unforeseen and possible devastating effects on the environment in generations to come. Although it may be amazing technology and on paper and in a lab, it could be great however when exposed to our natural environment and with changes in general over time we could be creating a much bigger problem...” – **Māori Respondent**

“They should not be used in Aotearoa because they can have unforeseen consequences, can affect the health and integrity of indigenous species and their life cycle and are an affront to the natural order and tikanga Māori.” – **Māori Respondent**

“I don't support the use of genetic technologies because these are very difficult to control.” – **Māori Respondent**

“I don't like using genetics to alter anything as I think we don't know the long-term results and what new problem we might cause.” – Pākehā Respondent
“Absolutely against genetic manipulation of any sort. Once released into the eco system there is no going back, and no way of knowing repercussions.” – **Pākehā Respondents**

“Genetic technologies are far too risky to be used outside of a controlled environment, and there have been serious failings even within these controlled environments. Far too risky to be allowed into the wider environment.” – **Pākehā Respondent**

“I am uncomfortable due to the unknown risks, e.g. side effects which could create even more resistant pests, or eradicate one pest only to discover it gives aid to another which is now unchecked/even worse than the previous threat.... it is impossible to understand all the permutations of these types of changes.” – **Pākehā Respondent**

Supporting this, other Māori and Pākehā respondents commented that they were against the use of genetic technologies because it interfered with the ‘natural order of things’. Individuals often commented on how they did not think it was right to ‘play God’ and that genetic technologies interrupt with the way things are meant to be. These respondents believed in a more hands-off approach and that the use of genetic technologies for pest control or environmental protection would be in direct opposition to that. For example:

"I strongly do not support interfering with any natural living organism. All natural organisms are put in this earth for a reason and should not be interfered with at all." – **Māori Respondent**

"They have an unnatural balance; I believe in natural creation. We shouldn't be creating things ourselves they should happen naturally." – Māori Respondent
"We should not manipulate and mess with anything in the natural world in such a way. We do not know the consequences of these actions." – **Māori Respondent**

"Everything within creation has a purpose. Man cannot play God and interfere with creation." – **Māori Respondent**

"I do not support the use of genetic technologies. I think we should back off trying to control all the existing species in NZ and let nature and evolution run its course. Natural methods like trapping and hunting should be used to try and manage the various animal populations to a certain extent in some areas. Large expanses of the DOC estate should be left alone to evolve into whatever they evolve into." – **Pākehā Respondent**

"It's dangerous to try and play God." – **Pākehā Respondent**

"I don't support it. Don't play God. They are there for a reason. They are part of the eco system." – **Pākehā Respondent**

"There are no known long-term outcomes of playing around with genetics. Whilst it is groundbreaking, natural selection would be my preferred way." – **Pākehā Respondent**

Others indicated that the country should be relying on existing or traditional pest control methods as opposed to using genetic technologies. The argument behind this standpoint was that these methods, such as hunting and trapping, have been effective in the past and that they should be used first and greater investment into these areas would be an effective solution:

"I don't hold much knowledge about genetic technologies, I am interested to learn how genetic technologies can be effective without harming or changing our native species that still exist. Because of my lack of knowledge around genetic technologies I do not support the use of genetic technologies. I believe as a kaitiaki of our taiao and as a harvester and user of our native species there are more natural approaches of eradicating invasive species, if only those who work in environmental spaces through tikanga and kawa like myself had more resources, financial support, and opportunities to create a better approach I believe there are other options." – **Māori Respondent**

“We have created the problem through intervention we viewed as best based on limited knowledge. Therefore, I am against the utilisation of genetic knowledge as an answer. We need to use old skills and tools we understand. Not those whose future outcomes we cannot quantify.” – **Māori Respondent**

“Pest control starts with good management and tools enabling efficient implementation. We have the tools required already all that is required is a change in management to enable it. Bio tech would need to be reversible, retractable, non-species transferring, non-contaminating and biodegrading.” – **Pākehā Respondent**

“We must have learnt that we can't throw a new method at the problem, which will always result in further chasing the tale when we import/construct a (foreseeable) consequence. Get back to basics and manage the pest burden down to a level that maintains the mana, health, and mauri of the Taiao. At some stage, either by power of numbers or economic strength, we may have the resources to eradicate pests from preferred areas.” – **Pākehā Respondent**

“Genetic technologies remain largely untested, and there is simply not enough data on long-term knock-on effects to use it. I think we should be making better use of non-Genetic technologies, such as trapping, environmental modifications, well controlled, specific poisoning.” – **Pākehā Respondent**

It is also worth noting that there were a large portion of Māori and Pākehā respondents who felt they were not informed enough about the topic to make a decision to support or disagree with the use of genetic technologies. This evidence suggests that there is not enough information available to the public to enable them to make an informed decision, which is supported by other results in this survey (e.g., the large number of respondents selecting ‘I don't know’ to many of the genetic technology questions). These respondents commented:

“Do we know enough about their pluses and minuses to say yes or no? I'm not sure but I support continued research into genetic technologies. The research and the conversation must be guided by joint, Tiriti-based decision-making processes, and underpinned by openness and a broad range of voices in the debate.” – **Māori Respondent**

“We should be very cautious before implementing anything in regard to these technologies.” – **Māori Respondent**

“It must be done ethically. I believe trapping and poisoning would be a more economical way to control pests. Genetic technology may be beneficial in the long run but at what cost? I'm hesitant to say that I support genetic technologies for pest control.” – **Pākehā Respondent**

“I would like to have access to the research that is completed on genetic technologies to inform my opinion. Open access research is important in this space.” – **Pākehā Respondent**

“There is still lots to know about the specifics in each species for me to make a decision. More research is needed and trials in controlled areas to see how things are affected short term and long term.” – **Pākehā Respondent**

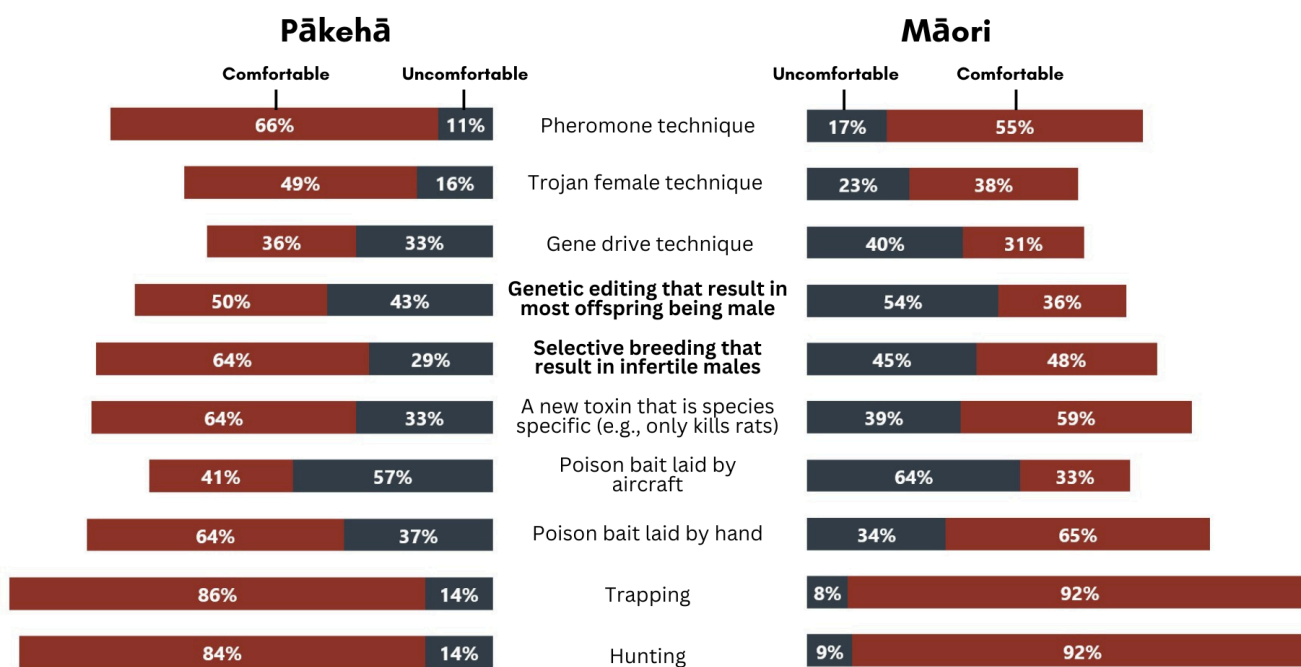
We also dedicated a section to this survey to explore comfortability with tools, who is most trusted to give information on genetic tools, as well as the factors that most influence decisions to protect the natural environment. As with many of the other questions, we created a list of potential ways to trap pests, some of which were genetic technology tools, and ask respondents to give their comfort rating for each one. The scale used for this question was:

- 1 – Should never be used under any circumstances
- 2 – Should only be used as a last resort
- 3 – I’m uncomfortable with this method but will accept it if appropriate controls are in place
- 4 – I am comfortable with this method if appropriate controls are in place
- 5 – I have no concerns at all about this method
- 6 – I don’t know

To make comparisons slightly easier, the graph below shows results when you combine a 4 and 5 (reflecting more comfort) and compare it to a 1, 2, and a 3 (reflecting a general lack of comfort). We then used this type of analysis to compare comfortability between Māori and Pākehā respondents.

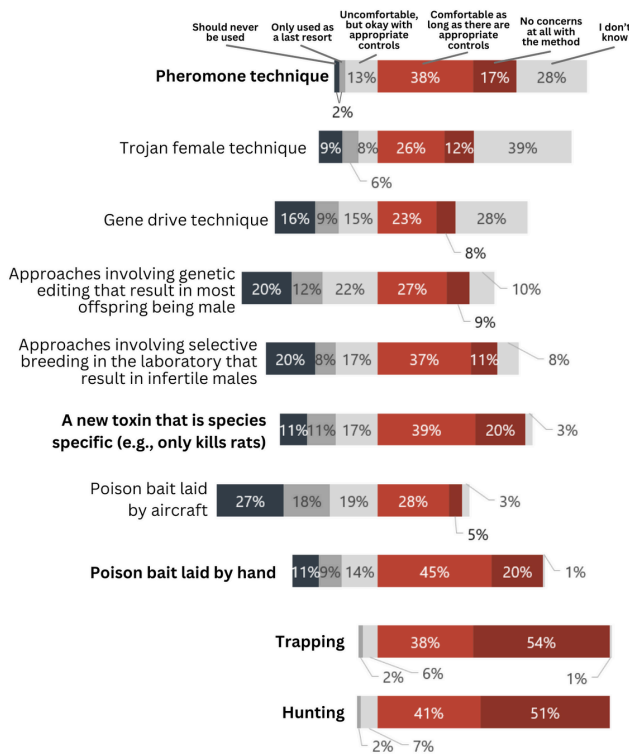
In general, Māori respondents were less comfortable with many of the genetic technology techniques we listed (e.g., pheromone technique, trojan female technique, gene drive technique, genetic editing). Those that had the largest differences in comfort were genetic editing that result in most offspring being male (54% of Māori were uncomfortable compared to 43% of Pākehā respondents), and selective breeding that results in infertile males (45% of Māori were uncomfortable compared to 29% of Pākehā respondents). It should be noted that both groups were quite comfortable with trapping and hunting methods of pest management, and both were more comfortable with poison bait lad by hand as compared to dropped from aircraft. Speaking generally, both groups were also less comfortable with genetic technologies to control pests as compared to methods that do not use genetics (e.g., hunting, trapping, poison, pheromone technique).

Generally, **Māori** were more likely to be **uncomfortable** with many of the genetic tools listed, but standouts included **genetic editing resulting in offspring being male** and **selective breeding**.

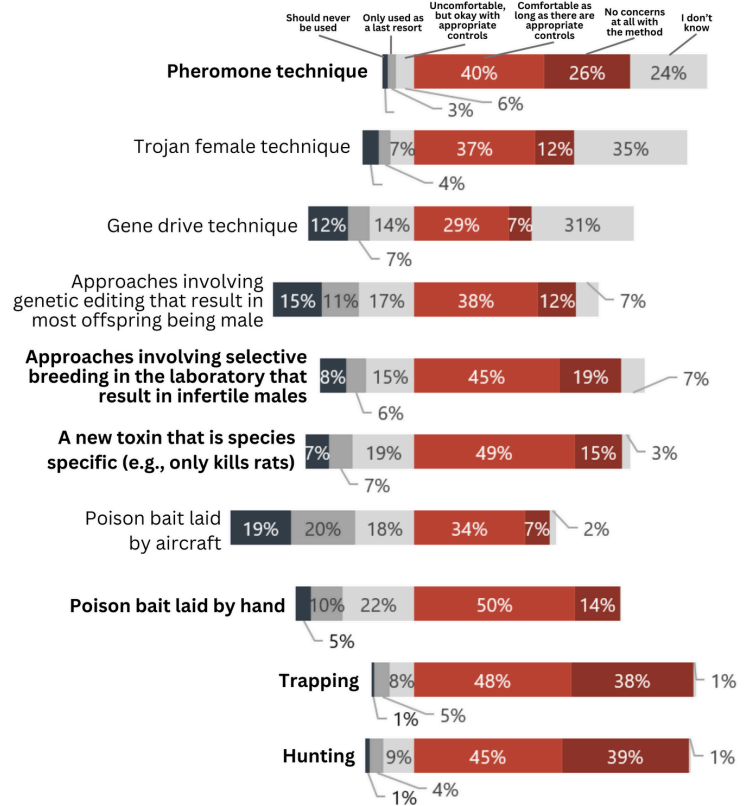


When looking at the two groups in more detail, a clearer picture emerges around comfortability and knowledge of genetic technologies. For both groups, it was common for respondents to answer 'I don't know' for questions about genetic tools (e.g., 39% of Pākehā said they didn't know for the trojan female technique). To us, this is evidence showing a general lack of knowledge about these genetic tools. This could also be driving some of the discomfort but may speak to the need for additional education about what the genetic tools are, what they do, and how they are applicable here in Aotearoa. Additionally, the percentages below also show the contrast in the number of respondents who have no concerns at all with a method vs. those who are comfortable if there are appropriate controls.

As long as there was appropriate controls in place, many **Māori** respondents said that they were **most comfortable** with the **pheromone technique**, a **new toxin that is species specific**, **poison bait laid by hand**, and **trapping/hunting** (including those who indicated they had no concerns at all with the method).

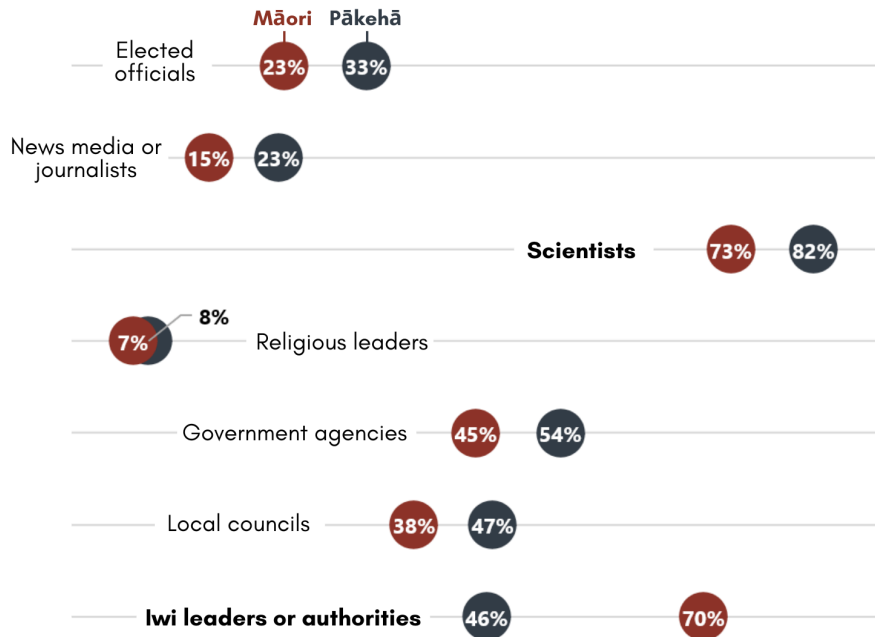


As long as there was appropriate controls in place, many **Pākehā** respondents were **comfortable** with many pest control methods, including the **pheromone technique**, **selective breeding**, **species-specific toxins**, **poison bait laid by hand**, and **hunting/trapping**.



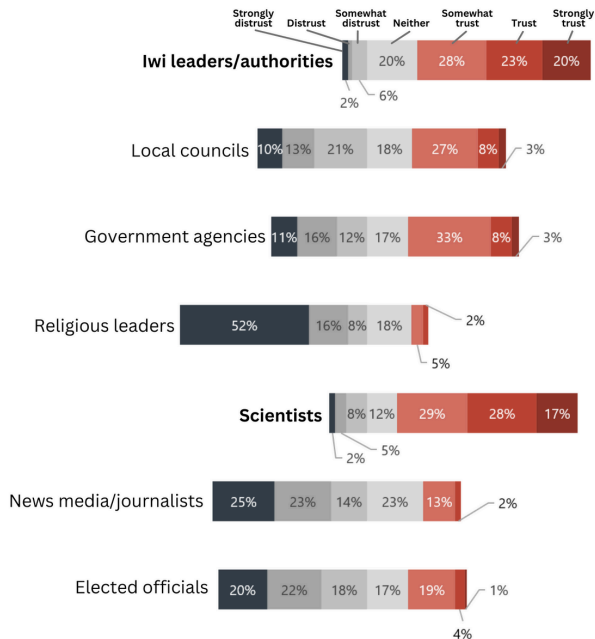
To explore communication of such tools to the public, we asked respondents about how much they trusted various sources to give them information about a new genetic technology tool. They did so on a scale from 1 (strongly distrust) to 7 (strongly trust) but the graph below reflects the percentage of respondents who selected a 5 (somewhat trust), 6 (trust), or 7 (strongly trust). Percentages between groups were quite similar, with scientists being the group that both groups trusted the most to give them information on genetic technologies (82% for Pākehā respondents; 73% of Māori respondents). However, for Māori respondents this was closely followed up by Iwi leaders or authorities (70%) and this was also the largest difference between groups in this set of results (46% of Pākehā respondents trusted this source, a difference of 24%). Both groups trusted religious leaders the least, followed relatively closely by news media and elected officials.

When asked how much they would **trust** different sources to give information about a potential genetic technology tool, both **Māori** and **Pākehā** trusted **scientists** the most. However, there was a **difference** in how much **Māori** trusted **iwi leaders and authorities** when compared to **Pākehā**.

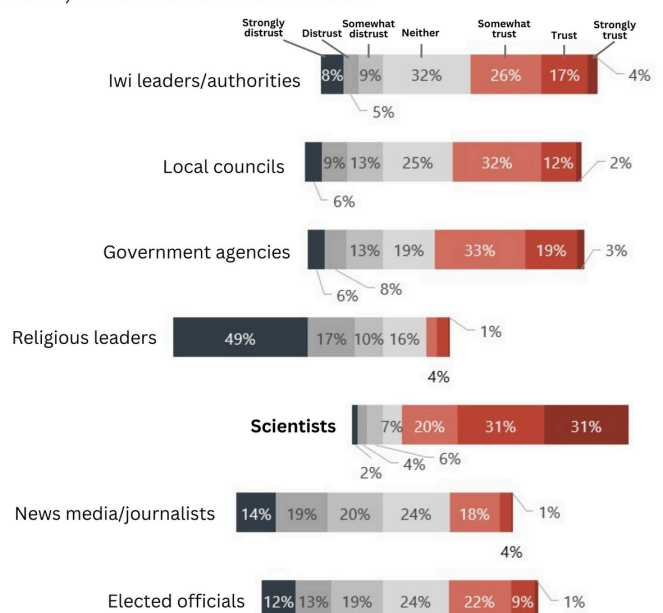


For interested readers, the breakdowns of percentages for each group are below. It largely reflects the graph above but does so in a more detailed manner.

Māori respondents **trust iwi leaders/authorities** and **scientists** the most to give them information about a potential gene technology tool. They trust **religious leaders, news media, and elected officials** the least.



Pākehā respondents **trust scientists** the most to give them information about a potential gene technology tool. The remaining sources were relatively split, but these same respondents trust **religious leaders, news media, and elected officials** the least.



Conclusion

These results reveal both nuanced differences and similarities in the attitudes and perspectives of Māori and Pākehā towards biosecurity, pest control, and the potential use of genetic technologies for environmental protection in Aotearoa. While both groups showed a high level of awareness of biosecurity and importance of pest management, notable variations emerged in their beliefs regarding the achievability of PF2050 and the factors influencing decisions on pest management.

The definition of pests, as well as the factors considered crucial in pest control decision-making, appear to be influenced by cultural, historical, and environmental contexts. Māori respondents emphasised relationships and connections, while Pākehā respondents often approached the issue from a biological standpoint, highlighting the social nature (including the value-set of the population) in defining what constitutes a pest. Divergences also surfaced in the factors that should guide pest eradication decisions, with a higher percentage of Māori supporting Te Tiriti o Waitangi's influence.

The survey shed light on the complexities surrounding the acceptance of genetic technologies for pest control. While there was a split between supporters and opponents, a substantial number of respondents expressed uncertainty, indicating a lack of information and awareness. Māori respondents exhibited slightly less comfort with the use of genetic technologies in environmental protection.

The survey's findings underscore the importance of recognising cultural and historical factors in shaping attitudes towards pest management and genetic technologies. Additionally, the results emphasize the need for inclusive decision-making processes that consider diverse perspectives, cultural values, and historical contexts, particularly in the realm of genetic technologies, environmental protection, and associated pest management.