

# ASSESSING THE IMPACT OF SEDIMENT IN WAIRARAPA MOANA

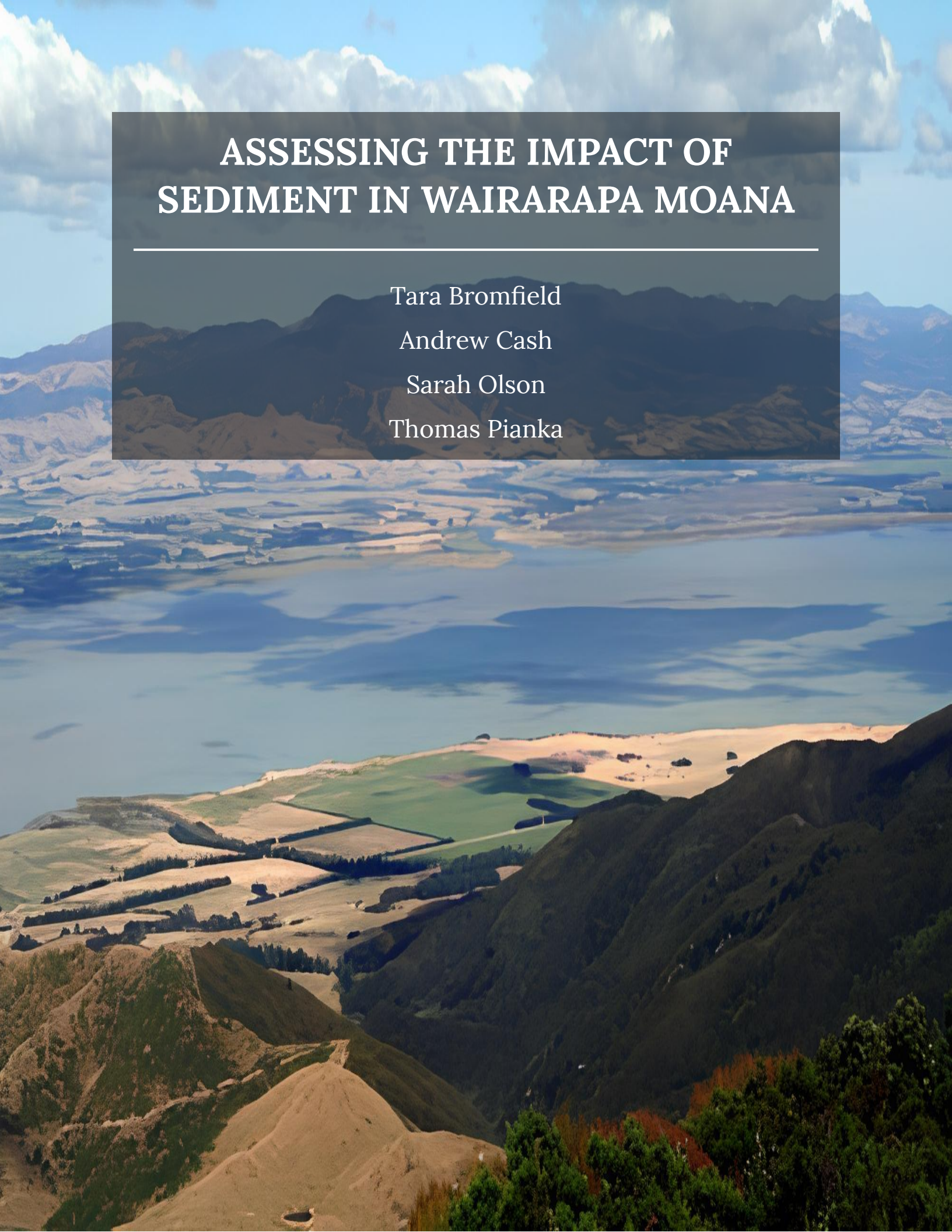
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# Assessing the Impact of Sediment in Wairarapa Moana

An Interactive Qualifying Project submitted to the Faculty of  
WORCESTER POLYTECHNIC INSTITUTE  
in partial fulfillment of the requirements for the Degree of Bachelor of Science.

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Date:

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*This report represents the work of one or more WPI undergraduate students submitted to the faculty as evidence of completion of a degree requirement. WPI routinely publishes these reports on the web without editorial or peer review.*

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# Abstract

The changing of the health of Wairarapa Moana due to environmental factors has affected its relationship with surrounding communities. This project aimed to understand how the health of the Moana impacts the connection between its surrounding communities and the environment. This project consisted of interviewing 19 individuals who have a deep connection with the Moana. We identified common themes from these interviews and created a video that recognized and amplified voices and stories from the Moana's community.

# Acknowledgments

We would like to acknowledge and thank everyone who was involved in the completion of this project. A special thanks to our partners, Ian Gunn, Kereana Sims, and Rawiri Smith, who were vital to the success of this project. They exposed us to Māori culture and gave insight into the Moana and its history, set up our interviews, and took care of us each time we traveled out to Wairarapa Moana. We greatly appreciate everything they have done over the past 14 weeks. We would also like to thank each of our interviewees. Every conversation we had was insightful, moving, and informative, and we are extremely grateful for the openness and kindness of our interviewees. We would also like to acknowledge our on-site project advisor, Professor Michael Elmes, who supported us and helped craft our written report throughout our time in New Zealand. Our ID2050 professor Ingrid Shockey was also vital to the shaping of our initial proposal, which helped set us up for the project as a whole.

# Authorship

The entire project was a collaboration between all project partners. The introduction, literature review, and methods sections were each written with equal effort from all students. For results and conclusions, Tara, Andrew, and Thomas focused more on the written report while Sarah focused primarily on the video deliverable. If there are any more specific questions, please contact: [gr-nz-23-waimo@wpi.edu](mailto:gr-nz-23-waimo@wpi.edu).

*This project is original to the project's authors and study participants and was not generated or assisted using ChatGPT or other AI tools.*

# Meet the Team



Hi! My name is Sarah Olson and I am from Framingham, Massachusetts. I am pursuing a BS/MS in Computer Science (graduation May 2025). Sharing stories is a passion of mine, which led me to start creating videos when I was about 10. Though I have never had interest in a typical film career, I hope that sharing stories through video will always remain my creative outlet. I am so grateful that I was able to bring that passion of mine to this project and be able to capture and share an experience that I know will never forget.

Hi, my name is Tara Bromfield and I am from Scottsdale, Arizona. I am a Biology and Biotechnology major in the Class of 2025. I am also a pre-health student and have a passion for neuroscience. In my free time I like to crochet, bake, and spend time with my friends and family. Before traveling to New Zealand for IQP I had never been outside the U.S., so this has been a great opportunity for me! I really enjoyed getting to meet so many different people during our interview process and gained a lot of insight about both indigenous culture and wetland management.



Hello, my name is Andrew Cash, and I am from Marlborough, MA. I am part of the 2025 class and pursuing a Computer Science major with a Finance Technology minor. I am also a member of the school's baseball team. While sports are my passion, I love spending time outside which is why I am so grateful for the opportunity to come to this beautiful country, and work on a project that immersed us in the environment. This was also my first time traveling outside the US, so I am setting the bar high!

Hi, my name is Thomas Pianka, and I am from Northborough, Massachusetts. I am pursuing a BS/MS in Computer Science, graduating with both degrees in 2025. Outside of school, I play the piano and organ, and I ski and play badminton. I am very grateful for this project, as it has expanded my worldview and given me great insight into Indigenous culture and ways of knowing, as well as how to maintain a reciprocal relationship with one's environment.



# Executive Summary

## Background

Wairarapa Moana is a wetland area located in the North Island of Aotearoa. Its most significant feature is Lake Wairarapa, which occupies approximately 86% of the Moana (wetland). Because the lake is shallow, strong winds blowing through the area cause motion in the water that dislodges and resuspends sediment sitting at the bottom, which pollutes the lake. The aggregation of sediment also impedes many of the culturally relevant features of the lake. To the residents that the Moana supports, the region is integral to everyday life. The excess sediment in the wetland has led to an environmental and spiritual imbalance that impacts the communities around it. To address this imbalance, there has been an ongoing effort to return the Moana to a healthy state of well-being that supports its ecosystem and its status as a culturally significant site for the Māori people.

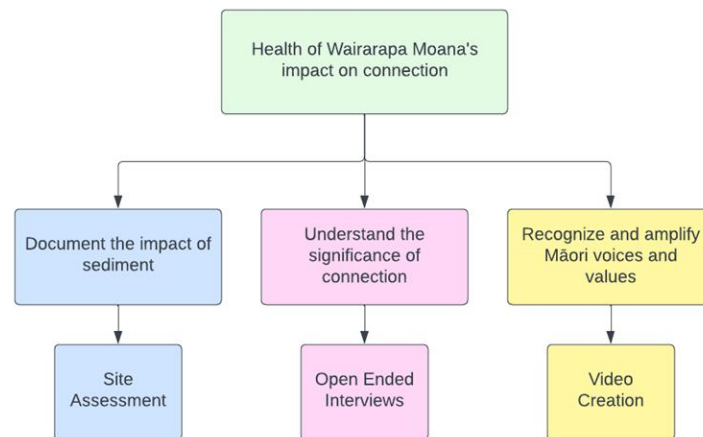
For centuries, Māori have followed *mātauranga* Māori. Dating back to the earliest Māori culture, *mātauranga* Māori “combines knowledge of Polynesian ancestors and the experiences of Māori living in the environment of Aotearoa” (Mātauranga Māori and Science, 2017, para. 1). Understanding the significance of Māori knowledge was crucial for this project. Historically, non-Indigenous research into Indigenous culture and individuals has been rife with disrespect and distrust. While we hope to move away from this type of research and thinking, we must acknowledge the difficulties of disconnecting Indigenous research from colonialist and imperialist perspectives. Indigenous knowledge is often treated as inferior to Western science unless it is in some way confirmed by scientific research. Trusting Indigenous knowledge and partnering directly with Indigenous communities can lead to much greater outcomes than denying their stories based on Western metrics of knowledge.

## Goal and Objectives

The goal of this project was to understand how the health of Wairarapa Moana impacts the connection between its surrounding community and environment. To accomplish this goal, our project was comprised of three main objectives:

- Document the perception of sediment and its impact on the Moana and its surrounding communities.
- Understand the significance of connection and reciprocity between the wetland and local communities.
- Recognize and amplify Māori voices and values concerning wetland conservation and environmental balance.

## Methodology



To accomplish our objectives, we performed three different methods of data collection:

- Site assessment of the wetland, documenting its current condition through photography and video.
- Open-ended interviews with partners and stakeholders of the Moana who have a significant connection to the wetland and understand what that connection means to their communities.
- Video production to provide a platform for our interviewees' stories, perspectives, and positions.

As non-Māori individuals without Indigenous backgrounds, we understood the potential challenges we faced due to our cultural differences. To avoid exploitative approaches to research, we examined sources such as *Decolonizing Methodologies: Research and Indigenous Peoples* by Linda Tuhiwai Smith and consulted closely with our Māori partners before moving forward with our interviews.

## Results

### Site Assessment

During our site assessment, we visited various areas of the Moana, including Lake Wairarapa and Lake Ōnoke, areas of preserved native bush around the wetland, rivers and tributaries, and restored wetlands such as Boggy Pond and Wairio Wetlands. We observed how the sediment has impacted the wetland, such as the color and turbidity of the lake water, the lack of native species, and dwindling recreational activity. These experiences as well as conversations with our sponsors helped us gain a personal connection to the wetland and an understanding of its current health.

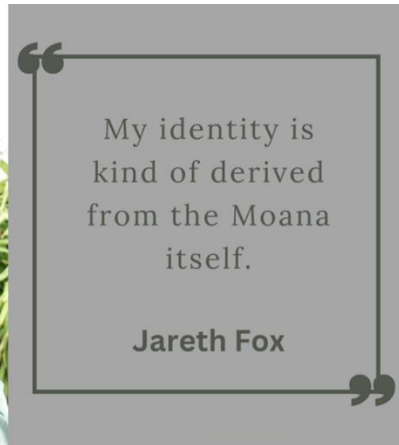


## Interviews

After our interviews, we conducted thematic coding to find common themes or ideas that were shared amongst our interviewees. These themes were ultimately used to guide the direction of our final video and are further described below.

### *Connection to the Moana*

The first common theme that we found throughout our discussions was the interviewees' connection to the Moana. More specifically, a connection was often a place or environment in which they felt the most comfort or at peace. It is no surprise that many of our Māori interviewees spent a lot of time talking about this



connection, given that a large part of Māori culture is rooted in the connection with the environment. What we found most interesting is that although all our interviewees expressed a connection to some part of the Moana, for many, they were in distinct locations.

### *Sediment's Impact Across Generations*

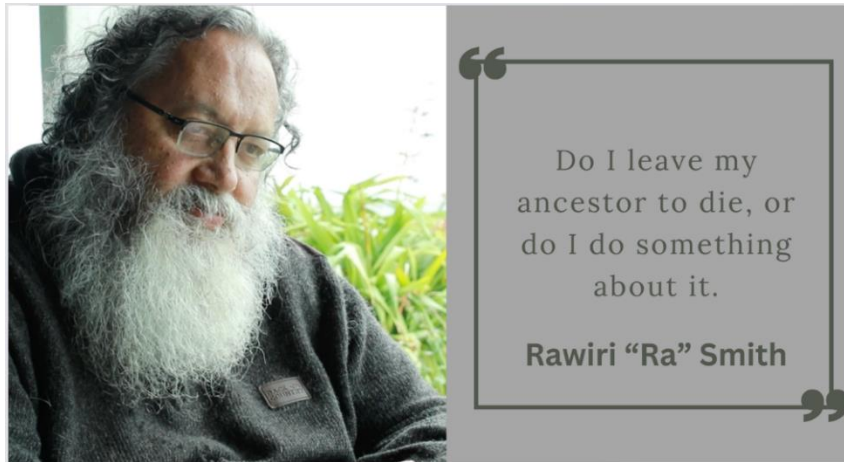
One of the biggest themes that emerged from our interviews was the difference in responses based on the interviewee's age and memories of the wetland as children. Many interviewees of the older generation (~50+ years) discussed their memories of how the Moana evolved over their lifetime. One of the Moana's greatest barriers to health is the excess sediment presence that clouds its waters. As discussed throughout the report, sediment presence has had a massive impact on the health of the Moana itself as well as community members' connection to it. Notably, the lake was not always so polluted by sediment, and the memories of a healthier lake are gradually being forgotten.

### *Feasibility of Restoration*

Another common theme from our interviews was the hopefulness that restoration of the Moana is possible. The interviewees generally felt that through the combined efforts of local communities and governmental bodies, the journey of restoration is on the right track.

### *Balance and Reciprocity*

Another talking point that many of our interviewees brought up was the importance of balance and reciprocity between the environment and the people who use it. In the context of Wairarapa Moana, reciprocity is exemplified by the idea that if a person or group of people use the land to benefit themselves, they should do something in return that will benefit the land. For centuries, Māori have maintained this balance and reciprocity. Despite the fact they used the land, they deeply respected it and gave back wherever they could. Recently, this balance has been lost as reciprocity became overlooked by many involved with the Moana, leading to its declining health.



### *Flooding and Flood Prevention Efforts*

Flooding and flood control was also a very common topic. In the past, Lake Wairarapa would endure a natural flooding cycle, such that the lake's water would fill surrounding wetlands and promote life. Unfortunately, in recent history, the wetlands surrounding the lake have been almost completely drained to make room for farms. These farms could not handle the effects of the flooding, so anti-flood efforts had to be made. Due to the draining and transformation of the surrounding wetlands, flood protection is necessary, but at the cost of destroying the Moana's natural life cycle and exacerbating sediment pollution.

## **Personal Reflections**

### *Impact of Storytelling*

The impact of storytelling became evident throughout this project. Storytelling is more than just the words being told or a mundane recounting of events; it is the environment created around the words that allows a memory, lesson, or wisdom to come alive. The difference that storytelling makes is its ability to transform the perspective of its audience. In the case of Wairarapa Moana, our interviewees were able to draw us into the colorful memories of their childhood, as well as help us experience the devastation knowing their children will not have the same

opportunities. We hope that our video and written report will not only help to keep their stories alive but also allow them the fullest opportunity to thrive.

### *Understanding Indigenous Perspectives*

Another way this project has shifted our perspectives is our understanding of the validity of Indigenous stories and the shift away from Western science. As students from a STEM school without Indigenous backgrounds, we are not often exposed to Indigenous ways of knowing. Storytelling and oral history are rarely discussed in our areas of study, let alone legitimized. This exposure to Indigenous stories that are often regarded as “myths” really helped us appreciate new ways of knowing. We were also incredibly surprised and humbled at how willing our interviewees were to open up to each of us upon our first meetings. One reason for this was most likely our partners’ relation to each of the interviewees as friends, family members, and colleagues. Another factor that likely contributed to the depth of our interviews was our practice of a *pepeha*.

### *Meaning of Being Connected*

This project has also opened our eyes up to what it means to be connected to a place. In the United States, we are so used to answering the question “where are you from?” with the nearest big city. This decision is often influenced by the massive sports culture in the States, and we feel that it often does not reflect a personal connection to the area, but a sense of pride in being part of that culture. While conducting this project we found that the question “Where are you from?” often meant something completely different to Māori and others connected to the Moana. Many Māori individuals discussed the Moana being a direct ancestor, showing a familial connection that we had never seen before this experience.

### **Video**

A link to our video “Glistening Waters: The Stories of Wairarapa Moana” can be found here: <https://youtu.be/c9MtPkqYKXo>

### **Conclusion**

This project aimed to understand how the connection between Wairarapa Moana and its surrounding community may be impacted by its evolving health. We had many insightful, emotional, and informative conversations that helped shed light on this topic. Sediment in Wairarapa Moana is clearly one of its biggest issues, both in terms of its cultural and environmental impacts. We hope the responses to our interview questions can shed light on the importance of Wairarapa Moana, and the potential ways to improve both the health of the Moana itself and the community’s connection to it.

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# Māori Glossary

<b>Aotearoa</b>	New Zealand
<b>Hapū</b>	Māori subtribe
<b>Iwi</b>	Māori tribe
<b>Māori</b>	Indigenous people of New Zealand
<b>Mātauranga</b>	Knowledge
<b>Mihi</b>	Māori greeting speech
<b>Moana</b>	Wetland
<b>Ngahere</b>	Native bush/forest
<b>Pākehā</b>	New Zealander primarily of European descent
<b>Pepeha</b>	A shorter form of a <i>mihi</i> , typically used by non-Māori
<b>Te Mana o te Wai</b>	The power of water
<b>Tuna</b>	Eel
<b>Whānau</b>	Family
<b>Whakapapa</b>	Genealogy
<b>Whakawhanaungatanga</b>	Relationship building

# Chapter 1: Introduction

Wairarapa Moana is a wetland area located about an hour's drive outside of Wellington, New Zealand. Its most significant feature is Lake Wairarapa, which occupies approximately 86% of the Moana (wetland). Because the lake is shallow, strong winds blowing through the area cause motion in the water that dislodges and resuspends sediment sitting at the bottom, which pollutes the lake. As a result, Wairarapa Moana has been formerly deemed one of the ten most polluted lakes in Aotearoa (*Govt funds for multi-million freshwater clean-up, 2012*).

Wairarapa Moana has been accumulating sediment from the surrounding stream beds, hillsides, and agricultural lands, partly exacerbated by human activities and flood management efforts. Due to this disruption of sediment, the health of the wetlands has suffered, causing flora and fauna native to the waters and the surrounding communities to suffer as well. For example, much of this sediment is also rich with nitrogen and phosphates, which can be detrimental to species that depend on the lake as their habitat.

The aggregation of sediment also impedes many of the culturally relevant features of the lake. Stemming from its roots as a rich fishing ground and Indigenous settlement, the wetland has been a site of ceremonial and spiritual significance for Māori communities for more than 800 years (*Wairarapa Moana - National Wetland Trust of New Zealand, 2021*). Beyond its richness as a source of food, the Moana plays a critical role in spiritual grounding. The emotional connection between many local Māori and the wetland is great. Following colonization, the lake also became an essential component of adjacent enterprises such as commercial farming and is a destination for recreational activities. To the residents that the Moana supports, the region is integral to everyday life.

The excess sediment in the wetland has led to an environmental and spiritual imbalance that impacts the communities around it. To address this imbalance, there has been an ongoing effort to return the Moana to a healthy state of well-being that supports its ecosystem and its status as a culturally significant site for the Māori people. Therefore,

the goal of this project was to understand how the health of Wairarapa Moana impacts the connection between its surrounding community and environment. To accomplish this goal, our project was comprised of three main objectives:

1. Document the perception of sediment and its impact on the Moana and its surrounding communities.
2. Understand the significance of connection and reciprocity between the wetland and local communities.
3. Recognize and amplify Māori voices and values concerning wetland conservation and environmental balance.

We hope this project can expand critical conversations that honor the heritage and well-being of the region.



# Chapter 2: Literature Review

In this chapter, we discuss the history of the wetland, its broad significance to the region, and ongoing efforts to value and respect Indigenous approaches to conservation and decision-making. This includes assessments of factors that contribute to sediment buildup in Wairarapa Moana. Recognition of Te Mana o te Wai will provide additional context for this culturally significant site.

## 2.1 Deposits, Debris, and Deception

Aotearoa is one of the most naturally beautiful countries due to its incredible biodiversity, unique landscape, and strong conservation efforts. However, the abrupt changes that colonization brought have continued to affect significant landmarks including the site of our project, Wairarapa Moana.

### Description of Wairarapa Moana

Wairarapa Moana is a large wetland area located on the North Island of Aotearoa about 75 kilometers (47 miles) from the city of Wellington. The Moana covers over 9,000 hectares (~22,240 acres), which includes Lake Wairarapa, Lake Ōnoke, and several towns (Wairarapa Moana Wetlands Project, 2013). As shown below in Figure 2.1, the Moana covers a significant portion of land that extends beyond the map, primarily to the north and east.

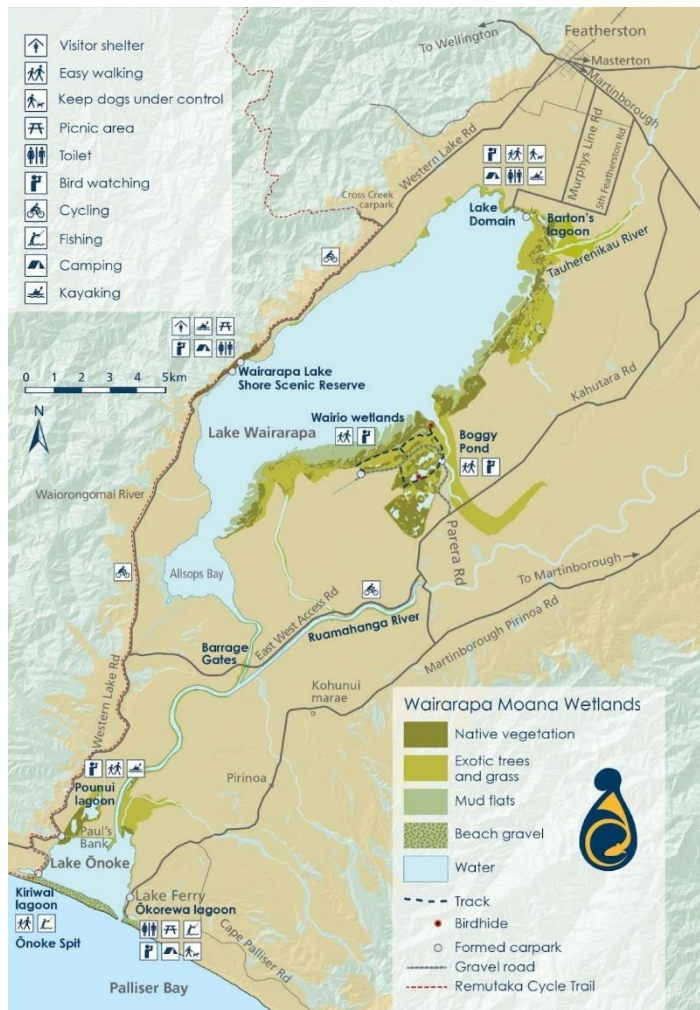


Figure 2.1: A map displaying the geographic layout of most of Wairarapa Moana (Wairarapa Moana Wetlands Project, 2013) CC BY 4.0.

The Ruamahanga River used to be the primary tributary of Lake Wairarapa prior to its diversion, which is discussed further below. Today, there are still many smaller rivers and streams that run in and out of Lake Wairarapa, with all the waterways being a source of life for the people and animals living there (see Figure 2.2 below). The web of waterways contributing to the sustainability of Wairarapa Moana extends far into the North Island, and one can easily see how the whole area and even the entirety of Aotearoa is interconnected. This interconnectedness means that the prosperity or suffering of one waterway does not exist in isolation.

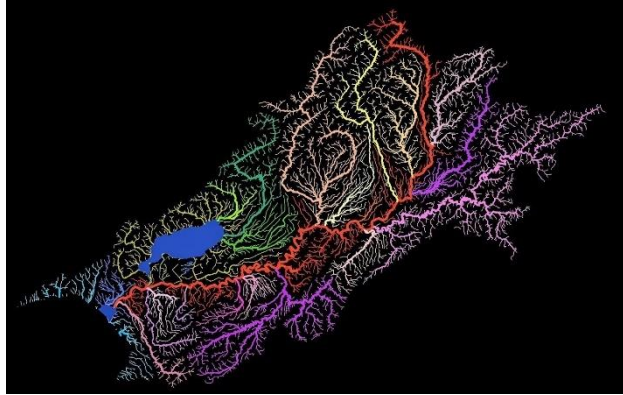


Figure 2.2: An illustration of the waterways running through Wairarapa Moana. Lake Wairarapa is the large body of water left of center (Stewart, n.d.).

With a wetland as significant as Wairarapa Moana, awareness of its health is necessary. Currently, however, Wairarapa Moana is plagued with a murky and often muddy water quality. Most of this discoloration stems from sediment buildup, whose effects are worsened by the complexities of the Moana's shallow depth and factors from its location between two mountain ranges (see Figure 2.3 below). The resuspension of sediment due to the strong winds is exacerbated by the lack of native bush surrounding Lake Wairarapa. Layers of grasses, shrubs, and trees, and even other wetland areas help to buffer the lakes from winds and rain, however much of this was removed and deforested by the settlers to make way for farmland.



Figure 2.3: An image showcasing an overhead view of Wairarapa Moana, highlighting its surrounding natural beauty and water discoloration due to sediment pollution (Hansen, 2023) *Department of Conservation*. CC BY 4.0.

In addition, there are other driving factors behind the poor water quality. Among them are indicators of the tumultuous relationship between Māori and the British Crown's divergent approaches to environmental decision-making.

## **Broken Promises**

Māori governance practices operate in conjunction with the land, rather than as entities separate from it. These values bind both spiritual and physical concepts as a way of relating humans with their community and environment (Henwood et al., 2016). As noted earlier, the ecosystem and community around it are not mutually exclusive, and the health of the land often directly reflects the health of the people. This model was in place for hundreds of years before the arrival of British settlers. Māori society was based on communal prosperity, and this approach was reflected in their network of governance based on tribal units.

The arrival of European settlers in Aotearoa to occupy and economize the land interrupted this framework, and conflicts with Māori increased. With no incentive to follow strict laws and driven by colonial interests, the settlers wreaked havoc on the local communities and environments. According to sediment core data collected in 2018, "European activities are responsible for the most prolific burning and land clearance which, possibly exacerbated by the 1855 CE earthquake, culminates in increased catchment erosion rates and the dominance of diatoms indicative of eutrophic conditions as well as reappearance of algae that prefer brackish/marine waters" (Waters et. al, 2018, p. 65). Despite *hapū* taking them in and Māori leaders urging the Crown to enforce rules, disputes continued (Mutu, 2015). Ultimately, the Treaty of Waitangi (*Te Tiriti o Waitangi*) was created and signed by both parties in 1840.

The Treaty of Waitangi was not created out of the Crown's desire to coexist in harmony with Māori, but rather as a tool to secure rights of ownership of Aotearoa. Moreover, because the colonizers and Māori spoke different languages, there were two versions of the treaty. The Māori version stated that both Māori and the Crown would

create and enforce separate laws for themselves so that Māori could continue to live their lives uninterrupted. On the other hand, the English version, seen by the Crown as the “correct” version and used to settle disagreements, stated that Māori would give up their sovereignty to the Queen of England.

In Wairarapa Moana, cultural clashes regarding land ownership between Māori and European settlers were becoming more common. With the Crown’s majority and increasing power, the fate of the Moana was unfortunately out of Māori hands. Māori still hoped that the Crown would make decisions that would benefit both the community and the Moana. Instead, the Crown took measures that increased their profits in the region, with no regard for the impact on Māori or the environment (Kereana Sims, personal communication, October 26, 2023). This led the settlers to “irrevocably damage the fabric of the land, disrupting natural cycles, damaging critical habitats, and eliminating or damaging native species” (Henwood et al., 2016, p. 2). Once they altered the fragile ecosystem, natural recovery became increasingly unattainable.

## **Rapid Transformation**

In the colonial quest to transform Aotearoa into a familiar and profitable agricultural landscape, significant modifications “led to catchment runoff of nutrients (e.g., nitrogen, phosphorus), pollutants (e.g., heavy metals, dioxins) and other pathogens (e.g., *E. coli* bacteria) into receiving environments such as rivers, waterways, and coastal environments” (Makey et al., 2022, p. 4), altering the natural cycle of the environment. For Wairarapa Moana, this buildup of sediment has been exacerbated by efforts to control or manage aspects of the Moana’s natural landscape, primarily focused on its tendency to flood nearby farms.

An example of this dynamic is the 1974 installation of the Blundell Barrage Gates. This initiative was a flood protection project known as the Lower Wairarapa Valley Development Scheme. The work focused on diverting the Ruamahanga River and building barrage control gates to control the flow of water to Lake Wairarapa (*Lower Wairarapa*

*Valley Development Scheme | Greater Wellington, 2020*). This project was backed heavily by farmers in the Moana region, since flooding consistently impacted crop yield, while Māori concerns about its effect on critical populations of fish were never considered (Grant, 2012). Before the diversion scheme, there was a large delta at the outlet of the lake's cutoff, and sediment was deposited in the lake and rivers further downstream before going out to sea. The land was often flooded during periods of heavy rainfall and other storm events, which the diversion scheme later prevented. While this project was deemed a success in flood prevention, it has ultimately hindered the lake's ability to filter sediment (*Wairarapa Moana - National Wetland Trust of New Zealand, 2021*).

This increase in sediment, in turn, has a negative effect on the populations of native *tuna* (eels), whose presence around harvest season has noticeably decreased since the early 70s (*Lake Stories Aotearoa New Zealand, 2013*). Additionally, the site is classified as supertrophic, indicating poor water quality due to excess nutrients, which is an unsustainable environment for native fish (Bunny et al., 2014). The obstructive outcome of the floodgates is felt beyond the overwhelming presence of sediment. The Moana's suffering has had a direct effect on all the beings that are connected to it. As the environment weakens, the physical protection, fuel, and fulfillment that it provides diminishes alongside it. Māori feel the Moana's sediment presence beyond the declining *tuna* populations and muddy appearance, especially since their connection to land often mirrors that of personal relationships.

Much of the increase in sediment deposits over the past couple of decades can be attributed to disruptions in the natural environment. This includes natural disasters such as earthquakes and floods as well as the outcome of manmade actions such as deforestation and an increase in agricultural use of the surrounding areas. It has been shown that "most (up to 80%) of the total phosphorus that enters waterways does so in heavy rainfall periods and storm events" (Perrie & Milne, 2012, p. 48). While many of these storm events are natural disasters, they are also caused or exacerbated by climate change. While the effect of climate change on freshwater ecosystems is still somewhat unknown,

it is predicted that “changes in rainfall and snow and ice cover will also impact the amount and seasonal timing of water entering and exiting freshwater environments” (“Climate change and possible impacts for New Zealand”, 2020, para. 19). Disruptions to the Moana’s environment, both natural and man-made, have had great impacts on sediment buildup and the overall health of the wetland.

## 2.2 Community Partners and Leaders

Understanding the perspectives of partners and stakeholders of this project is critically important. Local *iwi* that interact with and surround the Moana are key partners in efforts to restore the wetland. Additionally, stakeholders such as farmers, scientists, recreational users, and the organisms that rely on the lake must be accounted for. If the health of the Moana suffers, the farmers, communities, and wildlife do too. Among the primary partners of our project, Ian Gunn, Kereana Sims, and Rawiri Smith have all worked with the Greater Wellington Regional Council (GWRC) to support Wairarapa Moana conservation projects. Ian is the former Project Coordinator and Ra is a member of the Te Upoko Taiao and Ruamahanga Whaitua committees, while Kereana led the Flood Protection Operations Team based in the Moana. They are all passionate about ensuring the health and well-being of the Moana and the surrounding communities. They are also intent on incorporating frameworks for *mātauranga* Māori, which has been historically ignored in favor of Western science perspectives and indices. Their efforts along with that of other area activists and scholars have incorporated Māori views into governmental policymaking through their work with the GWRC.

## 2.3 Understanding the Importance of Mātauranga Māori

For centuries, Māori have followed *mātauranga* Māori. Dating back to the earliest Māori culture, *mātauranga* Māori “combines knowledge of Polynesian ancestors and the experiences of Māori living in the environment of Aotearoa” (*Mātauranga Māori and*

Science, 2017, para. 1). Understanding the significance of Māori knowledge is crucial for this project.

Conversely, Western science, the type of knowledge most foreigners are familiar with, is built on the premise of ownership and itemization that would support a seemingly objective and methodical approach to research. Fulvio Mazzocchi, an Italian biologist and philosopher who is especially interested in the relationship between science and other ways of “knowing” describes Western approaches to science as quantitative and isolating its subjects of study from the natural environment to create controlled experiments (Mazzocchi, 2006). Conducting experiments, gathering data, and analyzing results is the traditional approach for a researcher using a Western science framework. These findings are passed on through academic institutions (Mazzocchi, 2006). However, this concept of pulling subjects away from their natural environment differentiates Western science frameworks from *mātauranga* Māori.

For example, when assessing sediment in wetlands, a Western approach may be to take a sample from a lake and bring it to a lab for testing. While this can provide useful quantitative information about the sample, this approach lacks consideration of the connection and interaction that the water has with its surroundings over time and across cultural traditions.

*Mātauranga* Māori focuses on the retention of knowledge. For example, Māori might be more interested in knowing how to prepare a poisonous berry for eating, whereas a scientist may be more concerned with knowing why and how those berries are poisonous in the first place (*Mātauranga Māori and Science*, 2017). While Western scientific frameworks value academics and published archives to hold and share knowledge, *mātauranga* Māori is focused on the passing of knowledge through transgenerational experiences with family members or residents. In early Māori culture, experts were appointed from each tribe to retain the knowledge of the *iwi*. They would then pass this knowledge to the next generation and so on. As noted in an article on the subject, “*Mātauranga* Māori takes many forms of knowledge, including environmental knowledge



and traditional cultural practice” (*Mātauranga Māori and Science*, 2017, para. 6), and it is for this reason that acknowledging this process is extremely important for our study. Instead of simply conducting experiments to collect quantitative data, it is valuable to document the deeper connectivity of the ecosystem to the culture that surrounds it, through the perspectives and stories of the community members.

The importance of recognizing Indigenous knowledge is highlighted in Dr. Donna Martin’s study on “Two-Eyed” seeing within policymaking in Canada. Her research revealed that unfair policies, resulting in the displacement of thousands of people, were created without consideration of the environment and the Indigenous land. The study notes that this unjust policy was a direct result of the failure to consider Indigenous perspectives, emphasizing the importance of this matter (Martin, 2017).

For wetland management specifically, understanding the principles of Te Mana o te Wai is central to respecting Māori perspectives. Te Mana o te Wai translates to “the power or life energy of water” and prioritizes the health and spirit of the water itself. This principle introduces the idea that by “protecting the health and well-being of our rivers, lakes, streams and their freshwater bodies, we in turn protect the health and well-being of our people and surrounding environments” (*Te Mana o te Wai: Hierarchy of Obligations*, 2022, p. 1). This concept further emphasizes the interconnectivity of the wetlands and local communities.

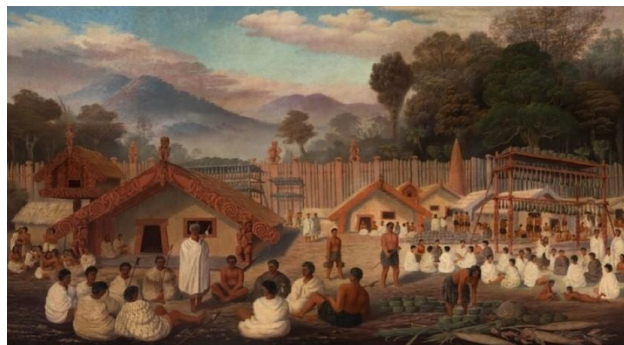


Figure 2.4: An image depicting an early Māori tribe teaching and sharing *mātauranga* Māori.  
Rights: <https://www.aucklandartgallery.com/>, 1923/3 Oil on canvas by Sam Stuart. Copyright Act 1994.

In another study, Dr. Phil Lyver, a senior Māori scientist and ecologist, conducted a study monitoring the forest state in New Zealand, with a deeper focus on using Western scientific frameworks and traditional *mātauranga* Māori to propel his findings. His study highlights the benefits of combining approaches. Lyver’s team started with gathering metrics for various forest structures. This included stem structures, tree density, tree seedling frequency, and other quantitative data used to assess the health of the forest (Lyver, 2018).

The study then shifted its strategy to gaining insight and historical knowledge from Tuawhenua Māori elders by conducting qualitative surveys. From a compilation of 80 community-based forest indicators, Tuawhenua elders identified 16 indicators to focus on (Lyver, 2018). The qualities of well-being selected by Tuawhenua elders drove the rest of the project. Based on these indicators, surveys were used to collect more information. The final result of the study combined the two frameworks’ datasets, along with qualitative reflections from Māori elders and community members. The evaluation connected the transgenerational knowledge and present evaluation from the Māori elders with the itemized data to develop recommendations about forest health.

*Mātauranga* Māori enables a deeper understanding of the environment as a whole network that supports life and a balanced web that exists across its current, past, and future states. The Moana has seen considerable efforts to measure its health using scientific metrics, but *mātauranga* Māori offers an opportunity to bring the lake into sync with community decision-making. This becomes increasingly important as threats of climate change escalate.

## 2.4 Respectfully Conducting Māori-Centered Research

Historically, non-Indigenous research into Indigenous culture and individuals has been rife with disrespect and distrust. According to the book on research methodology, *Decolonizing Methodologies: Research and Indigenous Peoples* by Linda Tuhiwai Smith, “the

ways in which scientific research is implicated in the worst excesses of colonialism remains a powerful remembered history for many of the world's colonized peoples" (Smith, 2012, p. 1). While we hope to move away from this type of research and thinking, we must acknowledge the difficulties of disconnecting Indigenous research from colonialist and imperialist perspectives. In the past, "Māori were represented as savages and, according to Salmond, his [Abel Tasman, first European to "discover" New Zealand] descriptions 'gave Māori a bloodthirsty reputation in Europe'" (Smith, 2012, p. 83). Non-Indigenous voices are often amplified to a much greater degree than Indigenous voices. Misrepresentations of the stories we hear have had drastic consequences that would mainly impact the Indigenous community being researched.

As mentioned previously, Māori versions of history are often disregarded, primarily because "the history of the colonies, from the perspective of the colonizers, has effectively denied other views of what happened and what the significance of historical 'facts' may be to the colonized" (Smith, 2012, p. 70). Indigenous knowledge is commonly treated as inferior to Western science unless it is in some way confirmed by scientific research. Largely documented through oral history, Māori historical stories that lack quantitative "proof" are treated as myth. The impacts of this lack of trust can also be seen in other areas of research such as disaster risk reduction (DRR). A study conducted in 2021 looked to investigate Indigenous knowledge and research into DRR in hopes of future collaboration and partnerships. Their research uncovered that "Indigenous knowledges and practices are very sophisticated as they are built upon gradual observations of environment, adaptation to the changing environmental patterns, and learning from mistakes spanning over millenniums and passed over generations" (Ali et. al., 2021, p. 2). Indigenous communities have extensive knowledge in how to endure natural disasters that much of the Western science community overlooked. Trusting Indigenous knowledge and partnering directly with Indigenous communities can lead to much greater outcomes than denying their stories based on Western metrics of knowledge.

Community based research, defined as “a methodological practice that places community partnerships at the forefront” (“What is Community-Based Research?”, n.d., para. 1) is a valuable methodology when collaborating with Indigenous communities. Understanding the importance of community involvement when conducting Māori-centered research is vital to being successful and avoiding exploitative practices. As highlighted previously, oral history and storytelling is a large part of Māori knowledge. These stories allow for knowledge and cultural values to get passed down through the generations. In this way, “the story and the storyteller both serve to connect the past with the future, one generation with the other, the land with the people and the people with the story” (Smith, 2012, p. 146). Understanding the history of Wairarapa Moana through stories told through longer, open-ended interviews allows for community involvement and ensures that the individuals involved are speaking for themselves and are not being misrepresented.

This study aimed to perform a type of ethnography, a field of anthropology focused on the study of cultures. While ethnography still has a history fraught with colonial influence, Schmalenbach and Kiegelmann (2018) discuss the idea of a “cyclical approach to ethnography”, which focuses on the idea of interdependence, explaining that “sensitivity, awareness, and preparedness of the researcher are crucial, and ‘all forms of experience must be respected and given attention due to their interdependent nature’” (Schmalenbach & Kiegelmann, 2018, p. 5). A holistic view is necessary when doing research, especially when interacting with large communities.

## **2.5 Learning from Integrated Frameworks in Wetland Restoration**

Case studies that integrate Indigenous perspectives on ecological remediation can provide insight into successful and unsuccessful approaches. In this section, we examine how other studies designed the restoration of Lake Oporoa, a culturally significant site in

Aotearoa. We also investigate the restoration of biodiversity in Ōhiwa Harbour using a bi-cultural approach.

## Case 1: Lake Oporoa

Lake Oporoa is a culturally significant site in the North Island of Aotearoa that has recently been studied and assessed for rehabilitation. In 2022, one study analyzed the lake using paleolimnology, a type of multidisciplinary approach that looks to uncover the ecological history of aquatic ecosystems based on analysis of sediment samples (Douglas, 2013). In addition to paleolimnology, a process of *whakawhanaungatanga*, or relationship building, was also utilized. This technique “involved a series of *hui* (meetings), *anoho wānanga* (live-in workshop), and an invitation onto *Rātā Marae*” (Short et. al, 2022, p. 3). Researchers were able to hear stories from the Ngāti Hauiti *iwi* about the historical conditions of the lake. Through an abundance of scientific data collection and analysis, as well as the contribution of Māori knowledge, it was determined that the condition of Lake Oporoa in the 1950s could be used as a “rehabilitation target”. During that time period, the growth of cyanobacteria and plankton was controlled, and the lake also “supported the cultural and spiritual associations of Ngāti Hauiti, especially with *tuna* harvesting and recreational activities” (Short et. al, 2022, p. 13). Work done by the Lakes380 project also shows that algae growth has spiked harmfully in the last 40-60 years, supporting the 2022 study’s assertion.

One of the key points to take away from this case study is that scientific knowledge and discovery can be used to support Indigenous knowledge and vice-versa rather than contradict or compete with it. Ecological data should be understood in the context of Māori stories to construct a more complete picture of a wetland’s history. Rather than treating the sediment as a problem to be solved, this study looked to analyze the sediment to restore balance in the lake. Ra Smith, the Environmental Manager for Kahungunu Ki Wairarapa, was recently quoted saying “our goal is to restore the lake, but the question is,

‘to what?’” (Vandergoes, 2023, para. 1). This is a vital question for both our own project and other wetland restorations, and the Lake Oporoa study was able to answer this by assessing the lake’s current and past health using Western and Māori metrics. This highlights the importance of collaboration in decision-making. Lastly, the *whakawhanaungatanga* process is an extremely valuable practice when collaborating with Māori communities. Building relationships with the local communities and understanding the *whakapapa* of Wairarapa Moana will add to the completion of our objectives.

## Case 2: Kuku Population in Ōhiwa Harbour

In 2021, efforts to restore the populations of *kuku* (mussels) in Ōhiwa Harbour, located in the North Island, were made by researchers who put in effort to incorporate both *mātauranga* Māori and Western science. The harbor itself is incredibly significant as it “is seen as a ‘taonga’ a priceless treasure that must be looked after to ensure that it continues to provide for the people” (Morrison, 2007, p. 28). Instead of attempting to survey the lake on their own, researchers reached out to Māori elders who were able to accurately locate the mussels and scallop beds in the harbor, even if they hadn’t been in the water themselves in decades (“Saving mussel beds with a bi-cultural approach”, 2021). Through collaboration, researchers were able to develop “biodegradable *taura kuku* (green-lipped mussel spat settlement lines, hereafter *taura kuku*) made from traditional Māori plant biowaste and other natural materials” (Paul-Burke et. al, 2022, p. 1). These settlement lines were successful in aiding the restoration of *kuku* populations in the harbor.

This study is exemplary of a successful collaboration between Māori and Western researchers. Māori knowledge frameworks were treated with validity rather than skepticism, which helped lead to greater outcomes. This study has received news coverage on multiple sites, most recently in the New Zealand Herald, indicating a public interest in both the restoration of biodiversity and bi-cultural approaches to solving

environmental issues. We hope to capitalize on this interest and support for increasing the health of local ecosystems.

## 2.6 Summary of Key Points

A variety of perspectives, indices, and practices can improve the health of the Moana's complex sediment issue. Understanding the history of the wetland is necessary to document the impact of the excess sediment presence. Connection between Māori individuals and the wetland itself has greatly evolved over time. Working closely with partners and stakeholders who have a relationship with the Moana will help paint a clear picture of how this connection has been impacted by the changing health of the wetland.

### Alignment with Sustainable Development Goals



Figure 2.5: SDGs from the UN that are most applicable to this project.

Finally, this project also addresses three Sustainable Development Goals (SDGs) as outlined by the United Nations: SDG-6, Clean Water and Sanitation; SDG-14, Life Below Water; and SDG-15, Life on Land. One aspect of the project will assess how the lake became enriched with sediment and how that sediment is affecting its health today. The flora and fauna that depend on Wairarapa Moana as their habitat are greatly affected by

the sediment, as are the ecosystem of organisms and residents living in and around the wetland.



# Chapter 3: Methodology

This project aimed to understand how the health of Wairarapa Moana impacts the connection between its surrounding community and environment. Three objectives were determined to accomplish this goal:

- Document the perception of sediment and its impact on the Moana and its surrounding communities.
- Understand the significance of connection and reciprocity between the wetland and local communities.
- Recognize and amplify Māori voices and values concerning wetland conservation and environmental balance.

This chapter will explain the approaches we used to accomplish each of these objectives.

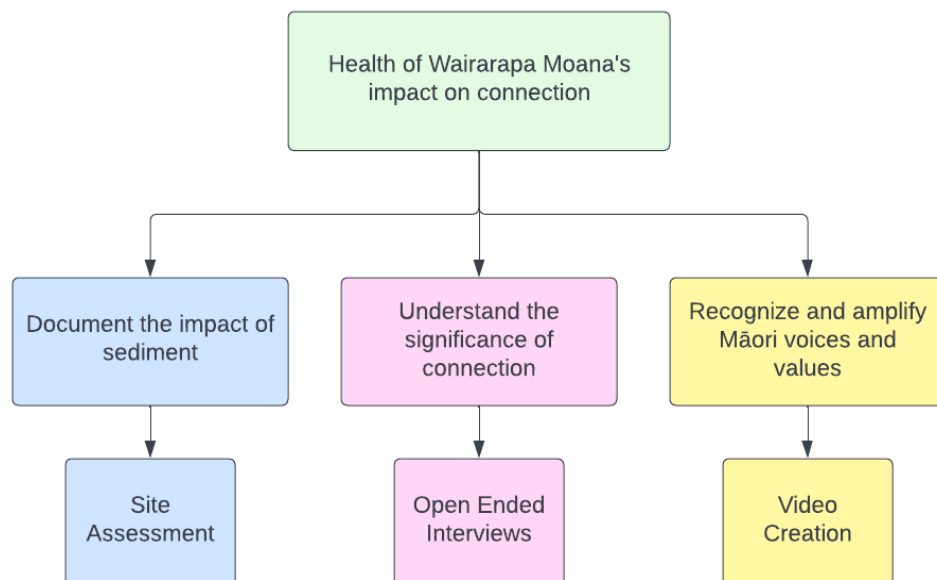


Figure 3.1: A flow chart displaying the breakdown of the actions used to complete our project goal.

### 3.1 Document the Perception of Sediment on the Moana

Sediment buildup in Wairarapa Moana has many ramifications, and to better understand these impacts we began with a site assessment of the wetland. This included visiting a sample of sites identified as priorities, particularly catchment points because of their involvement with the sediment's journey to the lake and surrounding areas. We also visited farmland and areas of native bush closest to the wetland. Experiencing these areas provided much needed insight into how deforestation and other human activity has impacted the lake and surrounding communities. We documented many of these conditions through photography and video.

To engage in discussions about the sediment conditions we interviewed a range of partners and stakeholders including residents and experts, both scientific and Indigenous. The responses to these and other interview questions helped build an idea of when the lake was most healthy in terms of sediment presence. These interviews also helped us understand how the sediment may have impacted the organisms living in and around the wetland. The health of the environment reflects the health of the community, so it was important to include this information. To coordinate the interviews, we paired two teammates per interview: one facilitator and one person to manage the videography. We recorded the audio and video of the interviews with the consent of the individual being interviewed (consent forms found in Appendix A). Further information about the interview and filming process can be found in Sections 3.2 and 3.3 below.



Figure 3.2: Site assessment photos in the wetlands (above) and native bush (below).

## 3.2 Understand the Significance of Connection and Reciprocity Between the Wetland and Local Communities

To understand the community's connection to Wairarapa Moana, we conducted interviews with area partners, residents, and visitors who have spent a significant amount of time in and around the lake. Key participants included members of the Ngāti Kahungunu *iwi*, stakeholders with commercial interests such as farmers and fishermen, and individuals who use the lake for recreational purposes (a complete list of interviewees and their biographies can be found in Appendix B). Our hope was to gain insight from those who have a significant connection to the wetland and understand what that connection means to their respective communities. When possible, we conducted these interviews in person and onsite in the Moana, or in Wellington over Zoom as a less preferable option.

The interview style we utilized was an open-ended technique. With representatives from the local *iwi*, farmers, and recreational users, the open-ended format was more appropriate as it evoked conversations that are “largely concerned with understanding and exploring the meanings given by people to the lives that they lead” (Ward, 2020, p. 42). Our goal was to create an environment where our interviewees felt comfortable sharing their personal experiences and stories. We hoped that through the art of storytelling, we would best be able to encapsulate the Māori perspectives in our final findings.

To gather our results from our interviews, we conducted thematic coding among all our interviews. To do so, we carefully rewatched all our recorded interviews and took note of the stories, subjects, and emotions that were repeated throughout different interviews. We did this because it is important to understand the culture and ideas that were shared amongst those we interviewed. We found that a lot of our guests shared similar experiences and emotions on many topics. Thematic coding was ultimately used to guide the narrative and tone of our final video.

While highlighting themes was very important for outlining the final product, we also acknowledged the importance of individual experiences. We did not only focus on similar responses or ideas, as we wanted to ensure multiple viewpoints were heard. Many individuals discussed similar topics with very different takes, and many of these contrasting viewpoints were showcased in the video. Our goal was to highlight many perspectives rather than to portray a singular “correct” answer to any individual problem.

### **3.3 Recognize and Amplify Māori Voices and Values Concerning Wetland Conservation and Environmental Balance**

The third objective was to recognize and amplify Māori voices and values concerning wetland conservation and environmental balance. We accomplished this by filming a series of interviews with *iwi* and other community members and producing a video to provide a platform for their stories, perspectives, and positions.

We believed this to be the best choice as involving authentic Māori voices was crucial in assuring that the Māori world view was fully included in this project. In letting our interviewees speak for themselves, we were able to directly highlight their thoughts and values. Oral storytelling, the primary way that Māori convey information, includes elements like facial expressions, gestures, and tone of voice that can be lost when translating their words directly into a written format. Additionally, publishing their stories in a video format lowered the barrier to listening, in turn making Māori voices more accessible. It has been shown that video can provide important information such as “reflections of the experience, in the direct words of participants, that contain insights provided by body language and tone, an immersive glimpse into the research world as it unfolds, and the potential to capture footage throughout the entire research process rather than just during prescribed times” (Walker & Boyer, 2018, p. 10). With this in mind, video seemed to be the best format to portray Māori stories.

We held our interviews in person, as described in Section 3.2. They were primarily conducted on-site at Wairarapa Moana, at sites such as the western side of Lake Wairarapa, and the shore near Lake Ōnoke (Figure 3.2). We were able to perform all our in-person interviews outside, which we felt added to the authenticity of our final product. Capturing our guests in the environment that they were speaking about added to the powerful emotion of the video.

We reached out to interviewees to establish a meeting location, date, and time. Our partners, Ian Gunn, Kereana Sims, and Ra Smith, provided the interviewees utilized in the study. This was helpful for us to find willing participants who could provide valuable insight that we may not have been able to identify otherwise. Interview guides for framing our questions can be seen in Appendix C.

Our primary footage (A-roll) came from the recorded interviews using both video and audio. We obtained secondary footage (B-roll) of Lake Wairarapa and the surrounding communities during our time on site. We used both a DSLR and mirrorless camera for video as well as an onboard extension microphone for primary audio recording. All recordings were preceded with a sound and video check before commencing to make sure our equipment was functional and set up correctly. We used a backup audio recording device for redundancy. The camera and interview set-up is shown in Figure 3.2 below.

We edited down much of the A-roll footage before completing all interviews. This allowed us to build our final video in pieces through a series of demos that built upon each other. This also allowed certain segments of the video to highlight common themes talked about across different interviews. Before the interviews were cut together, we decided as a group on five overarching themes that would drive the narrative of the video. This was done after the first 10 interviews were completed, which we finalized following the completion of the last interview. The editing began with producing an audio outline of each section and adding complementary B-roll footage which highlighted elements of what the interviewees were talking about. We ensured each interviewee was showcased

at least twice to highlight the variety of perspectives surrounding the Moana. Segments and clips were shared in advance with our project partners and other interviewees involved in our project to ensure the quality and tone of the final project. We budgeted time to add footage or re-film sequences as necessary.



Figure 3.3: An image showing our interview and videography set-up in Lake Wairarapa (left) and Lake Ōnoke (right).

### 3.4 Respectfully Interviewing and Partnering with Indigenous Communities

As non-Māori individuals without Indigenous backgrounds, we understood the potential challenges we faced due to our cultural differences. Throughout the process, we learned that “There is not a simple checklist that allows you to ‘be a good ally’” (Margaret, 2010, p. 9). We tried our best to come in with open minds and listen intently to our project partners who did a great deal to guide us through this process. A feeling we shared before coming to New Zealand was a fear of “getting it wrong” or offending Māori people. In an episode of “Land of the Long White Cloud” by RNZ on *YouTube*, this phenomenon is described as “Pākehā Paralysis” (Hotere-Barnes, 2019). We each worked to overcome this fear through discussions with our project partners and outside research. We took care to construct interview questions that were respectful and thought-invoking, and that allowed for narrative-style responses. To prepare for our conversations, we studied previous interviews with Māori individuals to understand successful approaches. When

analyzing the interview responses, we ensured that multiple perspectives were heard as to not generalize the ideas of an entire group of people, as warned against in “Moving from Tokenism to Respect” by Catherine Delahunty. Before our initial interviews we also took the time to create and practice our individual *pepeha* so that we were able to introduce ourselves in a way that reflected our intentions of a personal conversation rather than that of a study.

Lastly, we documented our own experiences with the Moana and surrounding community through individual and group reflections throughout the project. Many non-Indigenous and non-aboriginal individuals “have a deep disconnection from specific lands as a source of life, food, medicine, or genealogy” (Delahunty, 2020, para. 7). While not all of us held each of these sentiments, our relationship with the land we live in was very different from that of the Māori individuals we interviewed. We felt it important to consider how we evolved over the course of this process. Interacting with Indigenous communities was a new experience for all project members and being able to reflect upon our experiences allowed for a comprehensive understanding of our learnings overall. Many of the choices we made reflected our own backgrounds and viewpoints, so we felt it important to explain our various thought processes.

# Chapter 4: Results

## 4.1 Altering Our Project

Our first step upon arriving in New Zealand was changing and altering our project's goal and objectives. We did this after receiving feedback from our partners that the Māori perspective was not seen in our original proposal. To fix this issue, we decided to shift the focus away from the intersections between Western science and *mātauranga* Māori to understanding the significance of the connection between Wairarapa Moana and its surrounding community. The role of sediment remained a significant part of our project due to the health of the lake having such a significant effect on its connection to Māori and other community members.

Furthermore, we also recognized that the Māori culture and perspective is often overlooked. This was another concern that we focused on and wanted to address. To do so, we cemented the idea of producing a video as a key final deliverable. Our goal for producing a video was to pique people's interest in the topic of this project, enough so that they are inspired to learn more. We also determined that due to the sheer importance of storytelling in Māori culture, we wanted to ensure that we highlighted these stories in the most authentic manner possible. We felt that only a written report would not convey the full meaning and power of these stories.



## 4.2 Site Assessment Results



Figure 4.1: Images depicting Lake Wairarapa.

We conducted a site assessment over several visits to Wairarapa Moana and documented its condition through photography, videography, and writing. Upon our first visit, we observed the western side of Lake Wairarapa. We immediately noted the muddy appearance of the lake, each of us surprised at the color despite having read much about it (Figure 4.1). There were few signs of animal life in and around the lake, with only a few ducks in sight, and we wondered how safe the water was for the animals that called it their home. The land directly surrounding the lake was sparse and grassy. There were no large trees or other plant life to protect the wetland or us against the elements. Due to it being a particularly windy day, we also observed how the opacity of the water increased as wind speeds picked up in the area. This highlighted the impact of wind and strong storm events on the sediment's suspension in the Moana.

We also observed the second largest lake in the wetland, Lake Ōnoke, which is positioned south of Lake Wairarapa. The clarity of the water in Lake Ōnoke was much higher than that of Lake Wairarapa, even with intense winds stirring the water drastically. This was most likely due to it being very close to a catchment area where the lake connects to the ocean, as shown in Figure 4.2. At times, we saw the mouth of the Lake open towards the sea, and we watched as the freshwater and saltwater mixed (Figure 4.2). There was a clear difference in color between the lake and the ocean, with the lake having a much muddier hue. Seeing the stark difference between these two bodies of water only emphasized the sediment presence and served as a reminder of the human interventions that contributed to it.



Figure 4.2: Images depicting Lake Ōnoke, with the mouth opening to the ocean (middle).

On that first day we visited the wetland, we also observed the Tauherenikau River flowing directly into Lake Wairarapa. Our first impression was that the clarity of the water was much



Figure 4.3: The Blundell Barrage Gates (left), and rivers flowing between Lake Wairarapa and Lake Ōnoke.

higher than that of both Lake Wairarapa and Lake Ōnoke, pictured in Figure 4.3. The transparency of the water was almost surprising after observing the murkiness of Lake Wairarapa all morning. These rivers are usually able to provide filtration for the lakes around them. Unfortunately, one of the primary rivers that once flowed between both lakes, the Ruamahanga River, was diverted and no longer provides this filtration effect. Part of the diversion scheme included the construction of the Blundell Barrage Gates (discussed in Section 2.1 above), which halts the flow of water between Lake Wairarapa and Lake Ōnoke. The gates were down at the time of assessment, blocking the water flow from one side of the river to the other. They stood out in the natural environment as a clearly man-made structure. The stop in water flow due to the gates was in stark contrast to the other river sites we were able to observe. The water was not rushing under the bridge, but instead sat relatively still with a slow, unnatural ebb and flow against the metal. The gates have been contributors to the increasing sediment presence in the Moana. Many

interviewees discussed this structure and seeing it within this context brought a feeling of sadness and almost regret to the visit.



Figure 4.4: Images depicting Boggy Pond.

On the eastern side of the wetland, we were able to walk through Boggy Pond, which is a preserved wetland area separate from Lake Wairarapa and Lake Ōnoke. While it is still vastly changed from what would have been present without human intervention, this area gave us insight into how the landscape may have looked without drainage and flood prevention. Due to the area being more of a wetland than a lake, the water was still murky and had many algae blooms. Despite this, the presence of native plants, birdlife, and insects rather than invasive grass and other non-native species made this area feel healthier and livelier. While there was a feeling of hope in this area, the undercurrent of loss was still very present as this area only represents an exceedingly small subsection of the Moana.

Another aspect of the environment that is extremely important to the Moana and Māori culture is the native bush, or Indigenous forest of New Zealand. *Te Ngahere*, or the native bush, is home to thousands of species native to New Zealand, including insects, birds, shrubs,

trees, and many more. It is not only extremely significant to New Zealand's history, but also particularly important to Māori culture.

In New Zealand's early days, the whole country was said to be covered in bush. It offered habitats and protection to not only thousands of species, but the environment itself. Unfortunately, once settlers started to claim land, much of the native bush was removed through logging or burning. This not only destroyed the habitats of life, but also had an impact on the Moana itself. Because of the density of the native bush, it served as a protective layer to the environment around it.

We had an opportunity to venture into the native bush on an extremely windy and rainy day, as shown in Figure 4.5. After hiking through the sideways rain and eventually reaching the edge of the bush, we immediately noticed that when we stepped inside, the harsh conditions were masked. We no longer felt the wind or even the rain. This experience not only showed the importance of the protective bush but let us experience the comfort that it offers. It was undoubtedly much

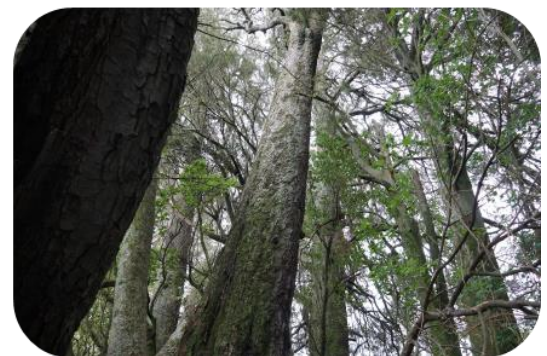


Figure 4.5: Images depicting a small area of preserved native bush near Lake Wairarapa.

calmer, warmer, and quieter under the trees, all of which gave the sense of welcoming comfort. It was not just us who felt this way about the bush environment, as many Māori that we interviewed also expressed the feeling of comfort

within the native forest. It is for this reason that the native bush is so important to the Māori community and their connection to the environment. Unfortunately, almost all the native bush surrounding Lake Wairarapa has been removed, and its protection along with it. Now, one of many reasons the lake is collecting large amounts of sediment is because it is much more exposed to the elements.

### 4.3 Having the Opportunity to Interact with Indigenous Communities

Before we began interviewing, a major part of our early project work was recognizing the fact that we are non-native individuals conducting interviews of native people about a topic that is extremely important to their culture. Because of this, it was extremely important that we not only remained respectful of their culture while interviewing, but also came prepared for the types of responses we ended up receiving. One of our primary partners, Ra Smith, stressed this idea heavily during our first weeks in New Zealand leading up to the interviews. To prepare for this, he provided us with several sources to look at past Māori interviews. The goal of studying these sources was not only to understand the best way to frame our interview questions, but also to familiarize ourselves with Māori responses. In both cases, the recognition of Māori storytelling and *mātauranga* Māori was extremely crucial.

Historically, interviews with Māori and other individuals connected to the Moana had been very structured and lacked background research. This led to insignificant results due to the brief and ingenuine responses that such a style of interviewing produced. At times, these methods also caused offense to the interviewees. To avoid making such mistakes, we developed interview questions that provoked stories from our interviewees. Furthermore, we practiced developing follow-up questions that would motivate even deeper thinking from our interviewees, which we carefully discussed with our Māori

partners. In addition to developing a more culturally appropriate style of interviewing, we also adopted important elements of Māori culture that would serve the interview purpose.

For example, we practiced a *pepeha*, a Māori greeting, which we started every interview with. A traditional *pepeha* would start with the speaker introducing their mountain and river. They would then move on to introducing their family name and first name. These are locations that they often relate to in a deeper way, and in Māori culture there is often a spiritual or ancestral connection between the speaker and their river and mountain. Finally, the speaker can introduce where their ancestors are from. In Māori culture, ancestors are extremely valued and important, and for this reason, to gain an understanding of who a person is, explaining your ancestral roots is often very helpful. There are many different forms of a *pepeha*, but these were the general guidelines we used when introducing ourselves. This was not only very well received by all our Māori guests, but also often created a smile and feeling of comfort between us and our interviewees.

We also had the opportunity to travel around the Moana and receive real life experiences on the land that so many community members feel extremely connected to. Some of these experiences included visiting both Lake Wairarapa and Lake Ōnoke, walking under the native bush, exploring a local dairy farm, and going on a road tour to see all the sights within the Moana. This not only gave us a much deeper understanding of the Moana's culture, but also allowed us to connect with our interviewees on a more personal level. We found much success when being able to relate our own experiences with those being interviewed.

## 4.4 Video Stories

In addition to this report, another primary deliverable for this project was a video encompassing the interviews we conducted to help amplify the voices of those connected to Wairarapa Moana. Our partners Ian Gunn, Kereana Sims, and Ra Smith, primarily coordinated these interviews. Individuals connected with the Moana from various

backgrounds were chosen to be interviewed. This included Māori with ancestry to the Moana, non-Māori who lived in the area, individuals with commercial interests in the wetland area, and many more. Talking to a diverse network of individuals allowed for many perspectives to be highlighted. Thematic coding was used to analyze our conversations, in which we re-watched each interview to find common threads that connected many of the responses. While the themes are all present in the video itself, we further discuss the results of our thematic coding from the interviews below.

A link to our video “Glistening Waters: The Stories of Wairarapa Moana” can be found with this link: <https://youtu.be/c9MtPkqYKXo>

## **Connection to the Moana**

The first common theme that we found throughout our discussions was the interviewees’ connection to the Moana. More specifically, a connection was often a place or environment in which they felt the most comfort or at peace. It is no surprise that many of our Māori interviewees spent a lot of time talking about this connection, given that a large part of Māori culture is rooted in the relationship with the environment. What we found most interesting is that although all our interviewees expressed a connection to some part of the Moana, for many, they were different locations.

For example, Tia Tuuta explained that she felt most connected to Lake Wairarapa. She told us stories of herself growing up at the lake as a child, spending lots of time by the water. Tia has such a deep connection and familiarity with the lake that when asked, she exclaimed she didn't even notice the change in its color, showing her lifelong journey with the lake. Much like Tia, Jareth Fox, a member of the Ngāti Kahungunu *iwi*, shared similar stories growing up in the Moana. He recalled telling stories and singing songs in the Moana as a child, which has created his own self-identity.





“  
My identity is  
kind of derived  
from the Moana  
itself.

Jareth Fox  
”

Alternatively, Tai exclaimed that he felt the deepest connection with Lake Ōnoke. He told stories of himself growing up as a child with the lake, explaining that he was raised fishing and diving there, which he continues to do to this day. Furthermore, Renaee Clark expressed that she felt extremely connected to the ocean. The ocean, which is closest to the Moana at the opening of the mouth of Lake Ōnoke, gives Renaee a sense of calm and peace when she visits.

Although Māori culture embraces these deep connections, we found that it wasn't just Māori individuals that feel a sense of connection somewhere in the Moana. For example, Sam Ludden explained his relationship with the rivers that flow throughout the Moana. Growing up around rivers and fishing for eels, Sam explained that rivers are something he can relate more to, rather than the lakes themselves. He gave a very emotional story of a moment where he came in close contact, face to face, with an eel underwater. Sharing the moment with the eel, he explained he “felt at home” and further exclaimed “[that moment] is who I am.” It is stories like that, Sam said, which shape people into who they are. Furthermore, Vern Brasell, a local dairy farmer, explained his connection to his dairy farm. Not only is this his home and livelihood, but his connection to the environment is

unlike many farmers. Vern explained his deep love for the environment and his efforts to restore it by creating wetlands and planting native bush.

For some, their affiliation to the Moana may not come with such deep emotional connection but may rather be presented as a passion. For example, Ross Cottle and Jim Law, president and coordinator of Ducks Unlimited in New Zealand respectively, exemplified extreme passion for the wetlands in the Moana. Ross and Jim are major advocates for the restoration of wetlands in the Moana. Through Ducks Unlimited, they fundraise, hold events, and conduct projects to recreate, replant, and bring back life to the drained wetlands of the Moana. Their enthusiasm and hope to pass this passion along to school kids, visitors, and just about anyone they can shows their true affection for the wetlands in the Moana.

In summary, interviewees often displayed a great connection to specific areas of the Moana. These were often brought up as childhood memories, experiences growing up in the area, or passions that they share. With these memories and feelings of connection, it is clear that both Māori and non-Māori can have a special relationship with the Moana and the surrounding land.

## **Sediment's Impact Across Generations**

One of the biggest themes that emerged from our interviews was the difference in responses based on the interviewee's age and memories of the wetland as children. Many interviewees of the older generation (~50+ years) discussed their memories of how the Moana has evolved over their lifetime. One of the Moana's greatest barriers to health is the excess sediment presence that clouds its waters. As discussed throughout the report, sediment presence has had a massive impact on the health of the Moana itself as well as community members' connection to it. Notably, the lake was not always so polluted by sediment. In his interview, Tai Gemmell explained "in my earliest memories as a child, it wasn't uncommon for the lake to be a blue color. Now the majority of the time, it's discolored." This was a sentiment shared by several of our interviewees, in addition to a

clear feeling of physical connection to the Moana. Many individuals remembered fishing, swimming, and enjoying the lake recreationally. Commonly, interviewees discussed *tuna*, or eels, that used to be plentiful in the lake. Two of our interviewees, Tai and Frances Reiri-Smith remembered harvesting, salting, and hanging eels to dry every winter. These interviews had a palpable sense of loss to them, with many individuals expressing sadness at their inability to share many of their experiences with their children and the younger generation as a whole.



“There’s a lot of stuff like [harvesting and drying *tuna*] that my children don’t even know about.”

**Frances Reiri-Smith**

Jareth Fox spoke in great detail about how he grew up singing songs and hearing stories about the Moana but lacked any physical connection to it. He further explained that “the lack of physical connection makes it hard to have a spiritual connection to it.” This was an idea reflected in many individuals’ stories about how the sediment was impacting their individual connection to the Moana. Katie Brasell, Ph.D., and daughter of dairy farmer Vern Brasell, grew up near Wairarapa Moana and remembers kayaking in the lake and nearby rivers as a child. However, she discussed in her interview that as a child, she had a certain perception of Lake Wairarapa, specifically that “it wasn’t somewhere you

would want to spend a lot of time” because of the color. This shows how many current and future generations may have their connection to the Moana impacted by its declining health. Despite this, when discussing the younger generation, many interviewees expressed a feeling of hope for how they may continue to fight for the restoration of the Moana. Jareth expressed later in his interview that the presence of the environmental and cultural issues surrounding the Moana had motivated him to become more invested in community restoration efforts. With more exposure to the issues and potential solutions, many are optimistic that a new generation of community members will continue and begin leading the efforts for environmental remediation.

While many interviewees shared the belief that the sediment had impacted their connection with the Moana, not everyone felt the same way. Tai Gemmell expressed his belief that his connection would never change, even with the variable health of the Moana. While he acknowledged that the ways in which he interacts with the wetland has evolved, he will never feel less of a connection to the Moana itself. Ra Smith spoke about the Moana from a different perspective, as if it was his grandparent. He explained “my relationship to you [Wairarapa Moana] *has* changed, and that I’m almost desperate to see you have better health.” His expression of desperation showcases how deep of an emotional effect the health of the Moana can have. Another interviewee, Sam Ludden, acknowledged that the sediment presence was “directly affecting me and my family, and there’s a ripple effect beyond that. So, instead of going to the river to swim, we go to the swimming pool, and I really don’t want that.” This shows once again that the impact the sediment can have on the community’s connection may span across generations.

## **Feasibility of Restoration**

Another common theme from our interviews was the hopefulness that restoration of the Moana is possible. The interviewees generally felt that through the combined efforts of local communities and governmental bodies, the journey of restoration is on the right track. One of these people, Katie Brasell, shared her belief that “it is possible to restore it

to some version of what it was.” However, there were some who did not believe that it was possible to completely restore the Moana back to its original state due to the vast amount of damage that has been done, such as Sarah-Jane Jensen, who had some reservations about the possibility of a full restoration: “I think it’s potentially unrealistic to have a goal of what it looked like before people; it’s never going to.”

Despite the consensus that restoration efforts will take longer than the time it took for the Moana’s health to deteriorate, interviewees generally agreed it is still possible to restore the Moana to a healthy state, even if it may never return to what it once was.



“

Yeah, if I didn't believe that [restoration is possible], I wouldn't be sitting in this job.

**Ella Buckley**

”

Many interviewees raised the idea of reintroducing macrophytes into the waterways in which they formerly resided as a potential way of restoring the Moana. A macrophyte is any kind of aquatic plant that lives in or near water and can either be fully submerged, partially submerged, or floating. Macrophytes would help alleviate the overabundance of sediment in the Moana by capturing it and preventing excess from reaching and suspending in large bodies of water such as Lake Wairarapa. Katie further elaborates by saying they “provide a structural habitat for things, as well as holding down the sediment.

They are important nursery areas for fish and insects, and they provide surfaces for algae to grow on, and they can also add oxygen into the water, which helps the aquatic life thrive.” However, such an undertaking is not without its barriers. According to Ra Smith, reintroducing macrophytes would cost approximately \$300 million New Zealand Dollars. With such a gargantuan cost, it is difficult to gather support for such an endeavor, as even if enough funding was generated, the length of time needed to complete the project would be very significant.

Despite these barriers, there is support and research going into potential macrophyte reintroduction, and this is just one potential solution to a large and far-reaching issue. Furthermore, to restore the Moana, a large collaboration would need to take place. When explaining what it would take to restore the balance to the Moana, Jareth Fox explained, “There’s a lot of interested parties, and it’s gonna take everybody.” While everyone we interviewed had their own opinions on how to potentially improve the health of the lake, one thing they all agreed on was that it would take many different groups of people coming together for the common goal of improving the Moana as much as possible.

## **Balance and Reciprocity**

Another talking point that many of our interviewees brought up was the importance of balance and reciprocity between the environment and the people who use it. According to Oxford Languages, reciprocity is the practice of exchanging things with others for mutual benefit, especially privileges granted by one country, organization, or person to another. In the context of Wairarapa Moana, reciprocity is exemplified by the idea that if a person or group of people use the land to benefit themselves, they should do something in return that will benefit the land. For centuries, Māori have maintained this balance and reciprocity. Despite the fact they used the land, they deeply respected it and gave back wherever they could. This mutually beneficial exchange has helped to maintain balance between people and their environment, allowing all involved parties to be pleased and satisfied.

Unfortunately, this balance has been disrupted for many decades, especially after the influx of British settlers. Much of the native forest was cleared and waterways were altered to create a space for farming, and not much, if anything, was done to make up for this loss. Only recently, in the last decade or two, have the efforts to restore what was lost been elevated to the top of priority lists for organizations and governmental bodies.

Especially today, Māori want to uphold their end of the reciprocal relationship to revert the damage that was done in the past. Ra Smith provided an analogy for the state the Moana is in: “if [they’re] on a life support system, here’s your loved one, hanging onto dear life. Some people get asked ‘should we have a non-resuscitation order?’, and that says, ‘are you willing to let your relative die?’” He sums up this ultimatum with this call to action:



“  
Do I leave my  
ancestor to die, or  
do I do something  
about it.

**Rawiri “Ra” Smith**”

He further stresses that “if I’m doing something about it, and [they’re] on life support, is that all I’m gonna do? Have them on life support? I don’t think that’s enough. I want my ancestor (Lake Wairarapa, Wairarapa Moana) to have a full life experience.” In addition to Ra, this opinion is shared by many others, Māori and non-Māori alike. It goes to show how

committed people are to returning the Moana to a state of balance and reinstating the precedent that individuals should give back to the land they live on and make use of.

## **Flooding and Flood Prevention Efforts**

The final topic that came up in almost every interview was flooding and flood control. Unsurprisingly, this is a controversial, yet important subject to the people of the Moana. In the past, Lake Wairarapa would endure a natural flooding cycle, such that the lake's water would fill surrounding wetlands and promote life. As Jareth Fox explains, this natural flooding not only made the ecosystem flourish, but people living in surrounding areas relied on it to sustain themselves. It would allow for large populations of fish, specifically *tuna*, which would feed these people. Not only did this flooding promote life, but it also controlled the impact of sediment on the lake. Ra Smith explained the lake “used to flood to three times the size it is now.” During this flooding, it gave the lake a chance to flush out its natural sediment due to the filtering effect flooding had. The lack of flooding the lake experiences today could be one of the major reasons for the massive sediment buildup in the lake.

Unfortunately, in recent history, the wetlands surrounding the lake have been almost completely drained to make room for farms. These farms could not handle the effects of the flooding, so anti-flood efforts had to be made. These efforts included diverting the Ruamahanga River away from the lake, creating countless flood walls and dunes, and installing the barrage gates in the Tauanui River. Such a change to the Moana has driven many of its past functions away.

In our interviews, we heard countless perspectives related to flood protection. The consensus of all interviewees seemed to be that for the current state of the Moana, most of the flood prevention efforts are a necessary, yet unfortunate and disliked reality. Ross Cottle and Jim Law, farmers and massive advocates for wetland restoration, explained that although the barrage gates and other flood measures aren't ideal, if they were taken away, the floods would destroy farms and houses in the surrounding area. The sad reality



seems to be that due to the change of environment in the areas surrounding the lake, flooding must be controlled. Katie Brasell says in her interview:



Flood measures like the barrage gates don't just take away from the natural wetland environment of the Moana, but many of our interviewees explained the effect of the gates on fish migrating through the Tauanui River. When the gates are down, the passageway for fish, which is used heavily during mating season, is blocked. Efforts have been made to counter the negative effect of the gates, but the harsh reality is that nothing will compare to the natural way of life.

## 4.5 Individual Reflections

Throughout the project, we each had many new experiences that helped shift our perspectives and be open to new ways of knowing. We each reflected on our experiences and came together to discuss them as a team. Below, we explain a few ways that our experiences helped change our mindset and understand our project on a deeper level.

## Impact of Storytelling

Storytelling is more than just the words being told or a mundane recounting of events; it is the environment created around the words that allow a memory, lesson, or wisdom to come alive. In a country that thrives off a fast-paced environment like the United States, it seems like storytelling, particularly its use in teaching knowledge, has been historically downplayed as nothing more than a valueless waste of time.

The true difference that storytelling makes is its ability to transform the perspective of its audience. The key is to make the audience feel as though they were there with you. In the case of Wairarapa Moana, our interviewees were able to draw us into the colorful memories of their childhood, as well as help us experience the devastation knowing their children will not have the same opportunities. The real impact of storytelling, however, is not what you do in the moment, but how you and your story will be remembered and acted upon.

The best stories and storytellers are the ones that are memorable, making them the most impactful. If a story keeps getting told, it ensures that its lessons will never be forgotten. By capturing the stories of the Moana, and how the types of stories being told are changing, we are ensuring the past, present, and future of Wairarapa Moana will not be left behind.

To prevent history from repeating itself, experiences need to be shared. Failure to share stories is failure to allow people to remember their ancestors' past and regional history in a memorable, meaningful way. With the Internet, stories can be kept and remembered, but until people can experience those stories through good storytellers, history will often repeat itself. We hope that our video and written report will not only help to keep their stories alive, but also allow them the fullest opportunity to thrive.

## Understanding Indigenous Perspectives

Another way this project has shifted our perspectives is our understanding of the validity of Indigenous stories and the shift away from Western science. As students from a STEM school without Indigenous backgrounds, we are not often exposed to Indigenous ways of knowing. Storytelling and oral history are rarely discussed in our areas of study, let alone legitimized. One of our partners, Kereana Sims, explained that Māori stories are based in fact, and while “embellishments” may be added, they are often used as a tool to help people remember and pass them down. This new perspective on Indigenous stories that are often regarded as “myths” really helped us appreciate new ways of knowing.

We were also incredibly surprised and humbled at how willing our interviewees were to open up to each of us upon our first meetings. So many of the interviewees trusted us with their emotional and personal stories, which we were extremely thankful for. In addition, as relative strangers, we worried that having each interview recorded could negatively impact the quality of the responses. However, no one seemed fazed by the video equipment, and we felt as though we could easily connect to those we were talking with. One reason for this was most likely our partners’ personal relation to each of the interviewees as friends, family members, and colleagues. Having the confidence and support of our project partners helped us build rapport with the interviewees. Without the amazing help of our partners, these interviews would not have been so personal and informative.

Another factor that likely contributed to the depth of our interviews was our practice of a *pepeha*. Many of the Māori individuals we interviewed expressed their gratitude and pleasant surprise at our use of the *pepeha* and offered to perform their own *mihi*. We believe our attempt at performing a *pepeha*, even if not perfect, acted as a way of showing people that we respected their culture and were making an attempt to bridge the gap between our differences. This project has helped shape and expand our worldviews for the better, and we are grateful for the experiences it has provided. We have also been shown that the world is more connected than one may realize, so careful consideration is

required when making an environmentally impactful decision, as it may have unintended consequences on many others.

## Meaning of Being Connected

This project has also opened our eyes up to what it means to be connected to a place. In the United States, we are so used to answering the question “where are you from?” with the nearest big city. This decision is often influenced by the massive sports culture in the States, and we feel that it often does not reflect a personal connection to the area, but a sense of pride in being part of that culture. For this reason, it seems as though people in Western cultures do not care as much about the environment they reside in; rather, they care mostly about the metaphorical location they are from. While this may not be the case for all, there seems to be a significant difference between how the people interact and respect the environment in the Moana compared to the United States.

While conducting this project we found that the question of “where are you from?” often means something completely different to Māori and others connected to the Moana. As mentioned in our thematic coding section Connection to the Moana, the individuals we interviewed had a very deep emotional and spiritual connection to the land. Their responses often invoked stories of childhood and creating relationships with the area that they were a part of. Many Māori individuals discussed the Moana being a direct ancestor, showing a familial connection that we had never seen prior to this experience. These different types of connections provoked a much more meaningful response to the question “where are you from?”, often leading the answer to be a river, lake, or other landmark of the natural environment. As stated previously, mentioning the place one feels connected to is one of the first components in a *mihi*. Providing each other with this background information right away gives each person a greater understanding of the other's life, and their growth into what they are now. This is much different from what many Americans experience; often this information is only uncovered later in the relationship.

# Chapter 5: Conclusions

This project aimed to understand how the connection between Wairarapa Moana and its surrounding community may be impacted by its evolving health. We had many insightful, emotional, and informative conversations that helped shed light on this topic. Sediment in Wairarapa Moana is clearly one of its biggest issues, both in terms of its cultural and environmental impacts. We hope the responses to our interview questions can highlight the importance of Wairarapa Moana, and the potential ways to improve both the health of the Moana itself and the community's connection to it.

## Moana's Significance to Māori and the Surrounding Community

Our site visits, interviews, and thematic coding have shown us that Wairarapa Moana is not just another geographic landmark to Māori. They view it as an ancestor or another member of their *whānau*. Jareth Fox remarked that “I consider myself a grandchild of this Moana, so when I introduce myself, often I introduce myself as a grandchild of this Moana.” For many, it is a significant member of their life, one they could not imagine living without. In short, it means the world to them. They work hard to fight and advocate for its well-being to ensure that future generations can have the same positive experiences and connection to the lake that they have. Māori believe that to restore the health of the Moana, they need to work with it to ensure that it gets what it wants, so this symbiotic relationship is the path they want to go down. When describing interactions with farmers, Ra Smith emphasized this relationship by saying “why don't we begin to work with [our] environment so that you can actually get some product [...] rather than not working with your environment.” Māori want to encourage everyone, no matter their profession, to help protect the land they care so deeply about.

In addition to Māori, we found that many non-Māori individuals had a connection to the Moana and cared about its well-being just as much as Māori. Some of our non-Māori interviewees have spent a significant portion of their life in the Moana, from which they

have positive memories and stories. Some have also acknowledged that in retrospect, they wish they spent more time appreciating the Moana when they were younger, with Katie Brasell saying “I spent a bit of time around Lake Wairarapa and Ōnoke, probably not as much as I would have liked to looking back on it now. I don’t think I really appreciated how special that place was.” Additionally, they have integrated themselves with the Māori community and have taken the time to learn *mātauranga* Māori. For example, when discussing his Māori-influenced upbringing, Sam Ludden recounted that “I grew up a bit of a confused child. I actually thought I was Māori, despite my white skin and my Irish heritage.” We have been shown that no matter the person, everyone we interviewed is connected to Wairarapa Moana in their own unique way, and they all want to see it healthy and thriving for generations to come.

## **Partnering with Indigenous Groups**

Partnering with Indigenous groups is important and can be very rewarding when done with respect. The importance of understanding how to partner with Indigenous and other marginalized groups has been expressed in works such as Jen Margaret’s (2010) “Working as Allies.” As mentioned previously, she expressed the sentiment that there is no one simple way to be an ally, and that it is “contextual and relational therefore issues need to be worked through with regard to the specific circumstances and relationships” (Margaret, 2010, p. 9). Building relationships and understanding the unique perspectives of those being partnered with is crucial for successful collaboration. Before we began our project, our first meeting with our partners consisted of explaining background information about ourselves as people. Doing so, we developed a great sense of trust and began building a relationship with each other. The idea of becoming partners started with a personal connection and progressed as we got to know each other. For example, we eventually bonded with friends and family of our partners and also those who were willing to be interviewed. This ultimately led to a very smooth and genuine interview process, which in the end made each interview feel like a personal conversation rather than a

research project. This not only provoked more meaningful responses, but also turned our project into something that we enjoyed and were very passionate about.

Furthermore, becoming partners with our Māori sponsors exposed us to Māori culture in a way that we could have never imagined. Gaining real life friends, and hearing their stories, gave us an understanding of their culture in a way that the classroom could never. Margaret also outlined that being an ally is a role that is “learnt in action” (Margaret, 2010, p. 11), a sentiment we fully agree with. Throughout the process, we had successes and failures that allowed us to learn how to navigate our partnerships. As discussed in Section 4.1 above, we had to adjust the course of this project upon first arriving in New Zealand. One of our partners, Ra Smith, raised the question “how did you consider the Māori world view in your shaping of the proposal?” This question made us reconsider many of our preconceived notions of how we went about both writing the report and the scope of the project itself. Outside of changing the goal of our project, researching sources such as *Braiding Sweetgrass* by Robin Wall Kimmerer and *Enlivenment: Toward a Poetics for the Anthropocene* by Andreas Weber allowed us to better understand how to write about our own experiences with the natural environment as shown in Section 4.2 above. Lastly, listening to our project partners and interviewees discuss their genuine care for and connection to the Moana gave us an understanding of the Māori environmental perspective that could not have come from any other source. We are so grateful for our partnership with the Moana community and for the opportunity and knowledge they generously provided us.

## **Video Impact**

Our final video included footage and audio from the 18 interviews conducted as well as background footage of various areas of the Moana. We received many positive messages about the video from our partners and interviewees alike. In contrast to our original proposal, our partners felt that the video showcased many different perspectives in a thoughtful manner. They also expressed much support for videography as a form of data

representation and social change. They highlighted the video's ability to capture body language and tone in a way that written reports are unable to convey in the same manner. We believe the support for this video helped express the importance of visual storytelling and videography for similar ethnographic studies.



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# Appendices

## Appendix A

### Audio/Video Consent Form

#### CONSENT TO AUDIO/VIDEO RECORDING & TRANSCRIPTION

Assessing the impact of sediment within the communities of Wairarapa Moana

We are a group of students from Worcester Polytechnic Institute (WPI) in the United States. We are conducting interviews to learn more about how the health of Wairarapa Moana impacts the connection between its surrounding community and environment. If you are willing to participate in this project, please read and note your preferences on this form. The final results will be made public.

- a. Permission to record, and use such recording of, your voice during this interview
  - Yes
  - No
- b. Permission to film, photograph, tape, or otherwise make a video reproduction of you
  - Yes
  - No
- c. Permission to attach your name or other identifying information to audio recordings of you
  - Yes
  - No
- d. Permission to attach your name or other identifying information to film, photographs, tape, or other video of you
  - Yes

No

e. Permission to use your words in our final report

Yes

No

I understand that these interviews will be published at WPI for education purposes and made available to the public. Video and audio recordings will be uploaded to the internet and made public.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_



## Appendix B

List of interviewees and a short biography for each.

- Taiawhio “Tai” Gemmell
  - Tai was raised fishing and diving at Lake Ōnoke, and today continues to fish while retaining the same affinity to the place. He is also a member of, and General Manager for Ngāti Kahungunu ki Wairarapa.
- Hamuera Sam Ludden
  - Before Sam became a member of Ngāti Kahungunu ki Wairarapa, he was a sculptor particularly known for his sculptures of *tuna* (eels). He was raised in the Wairarapa area with heavy Māori influence, which helped cultivate his support for the improvement of the Moana.
- Jareth Fox
  - Jareth grew up in the Wairarapa area and is currently the Kaitohu Matua Māori (Senior Māori Advisor) for the Greater Wellington Regional Council.
- Frances Reiri-Smith
  - Recipient of the Queens Service Medal and member of Ngāti Kahungunu ki Wairarapa, Frances grew up in the Wairarapa and still resides in Masterton today. She holds incredibly rich memories and stories, both from her life and from her ancestors’ lives.
- Rawiri “Ra” Smith
  - Ra has strong ancestral ties to Wairarapa Moana and is a member of the Te Upoko Taiao and Ruamahanga Whaitua

committees at Greater Wellington Regional Council, as well as the Environmental Manager for Ngāti Kahungunu ki Wairarapa.

- Haami Te Whaiti
  - Haami was born in Martinborough but moved to an *iwi* reserve in the middle of the North Island after the Moana was gifted to the Crown. He is currently the chair of the Ngāti Kahungunu ki Wairarapa Tamakinuiarua Treaty Trust, Post Settlement Governance Trust.
- Renaee Clark
  - Renaee grew up in Wairarapa Moana gathering Koi and harvesting watercress with her *whānau* at Lake Ōnoke and Lake Wairarapa. She has a strong connection to the sea and is currently the Environmental Manager of Iwi Development for Ngāti Kahungunu ki Wairarapa Tamakinuiarua Treaty Trust, Post Settlement Governance Trust.
- Ella Buckley
  - Ella is a Project Developer of the Wairarapa Moana Restoration at Greater Wellington Regional Council.
- Sarah-Jane Jensen
  - Sarah-Jane is new to the area, moving to Featherston recently after starting a new job as a Project Developer for the Wairarapa Moana Restoration at Greater Wellington Regional Council. She had never heard of Wairarapa Moana before moving, but says this new environment is growing on her.
- Pikitia “Tia” Tuuta
  - Tia grew up in Wairarapa Moana and has fond memories of playing in Lake Wairarapa as a child. She is the current Manager

of Iwi Development for Ngāti Kahungunu ki Wairarapa  
Tamakinuiarua Treaty Trust, Post Settlement Governance Trust.

- Margaret “Maggie” Feringa
  - Maggie currently resides in Masterton, she has a love for and long history of participation in conservation efforts in Wairarapa Moana and continues to make her voice heard, even at the age of 87.
- Vern Brasell
  - Vern is an innovative farmer and partner of 680-acre Kaiwaiwai Dairies located between Featherston and Martinborough. He has reconstructed wetlands on his farm and works to show other farmers the benefits of it.
- Katie Brasell
  - Katie is an environmental scientist who was raised in Wairarapa Moana on her father, Vern Brasell’s, dairy farm. She recently completed her PhD in Molecular Ecology & Paleolimnology through Auckland University with the Lakes380 project focusing on using sedimentation to understand the lake’s past.
- Stephen Hartley
  - Stephen is a current Associate Professor at Victoria University of Wellington in the School of Biological Sciences. He has done extensive environmental research in the Wairarapa area.
- Ian Gunn
  - Ian is the former Project Coordinator for the Greater Wellington Regional Council’s Wairarapa Moana Wetlands. He is a longtime advocate of the area and has sponsored many previous WPI Wairarapa Moana projects.
- Tony Silbery

- Tony is a former Wairarapa based ranger for the Department of Conservation with a very detailed knowledge of native flora and fauna in the area.
- Philippa Crisp
  - Philippa is a former Team Leader, Terrestrial Ecosystems and Quality, Environmental Science at the Greater Wellington Regional Council.
- Ross Cottle
  - Ross is the president of Ducks Unlimited, an organization that promotes habitats for waterfowl, with a passion for restoring wetlands in Wairarapa Moana.
- James “Jim” Law
  - Jim is a member of Ducks Unlimited who has been a huge advocate for restoring the Wairio Wetland in southern Wairarapa. He is also an owner of Palliser Ridge, a sheep and beef farm located in South Wairarapa.

## Appendix C

Interview Guide: General questions used during each interview, not including specific interviewee questions or follow-up questions.

### General Interview Questions:

- Can you tell us a little bit about your connection/relationship with Wairarapa Moana? What does the Moana mean to you?
  - Why is this connection important?
- We've heard from others that the changing health of the Moana has impacted their feeling of connection with the Moana. Have you felt your own connection evolve or change over time?
- A large part of our project is to examine the impact of sediment in Wairarapa Moana. How do you view the sediment presence in the wetland?
- We have learned a lot about balance and reciprocity between Māori people and their environment. Do you think there is an imbalance in terms of sediment presence in the wetland?
  - If so, when do you think the sediment presence began to become unbalanced?
- Do you think the sediment has affected your connection to the Moana?
- What would it take to restore the balance or your connection to Wairarapa Moana?