NIWA
Taihoro Nukurangi

Prioritising Wetland Restoration Efforts Based on Mātauranga-ā-Hapū in the Kāwhia Rohe

A Pilot Study

Prepared for Te Wai Māori & Maniapoto Māori Trust Board

May 2017

Prepared by:

NIWA:
Kelly Ratana

MMTB:
Ngahuia Herangi
Shannon Te Huia
Wikitōria Tāne
Ngā Tai o Kāwhia interview and wānanga participants

For any information regarding this report please contact:

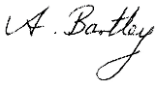
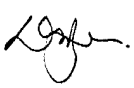
Kelly Ratana
Environmental Scientist
Te Kūwaha o Taihoro Nukurangi
+64-7-857 1729
kelly.ratana@niwa.co.nz

National Institute of Water & Atmospheric Research Ltd
PO Box 11115
Hamilton 3251
Phone +64 7 856 7026

Ngahuia Herangi
Team Leader
Whanake Taiao Team
+6421 067 2374
ngahuia@maniapoto.co.nz

Maniapoto Māori Trust Board
P O Box 36
Te Kuiti, NZ
0800 668 285

NIWA CLIENT REPORT No: 2017124HN
Report date: May 2017
NIWA Project: MMT17301

Quality Assurance Statement		
	Reviewed by:	Tipene Wilson (MMTB)
	Reviewed by:	Erica Williams (NIWA)
	Formatting checked by:	Alison Bartley
	Approved for release by:	Dave Roper

Cover Photo: The hapū participants from the Ngā Tai o Kāwhia Regional Marae Committee and the project team at the Maniapoto Māori Trust Board offices [Photo supplied by: Ngahuia Herangi MMTB].

Contents

Tables

Figures

Executive Summary

Over the past 100 years wetland extent has significantly reduced with 10% across all of New Zealand and only 8.9% in the Waikato remaining almost a decade ago, when compared to pre-human extent (Ausseil, Gerbeaux et al. 2008). Remaining wetlands are under threat from land modification and other human activities and Māori are becoming increasingly aware of the dire state of repo (swamps) and puna (springs), resulting in many hapū- and iwi-led projects centred on the restoration of repo and puna within their rohe (Taura, Schravendjik-Goodman et al. 2017). The protection and restoration of the remaining wetlands is paramount to ensure tāngata whenua values are retained including habitats for taonga species, maintenance of cultural use and associations, as well as the benefit to ecological and hydrological function. The Waikato Regional Council (WRC) recognises Maniapoto holds concerns for wetlands as habitat for tuna fisheries in their Regional Plan[1]. However, the issue of declining wetlands has been felt much more broadly by Maniapoto (Tipa, Williams et al. 2014; Maniapoto Māori Trust Board 2015a; Maniapoto Māori Trust Board 2016). Iwi, primary industry, councils, non-governmental organisations, research institutes and community groups are all engaged to restore wetlands. However, restoration of wetland ecosystems is often undertaken at priority sites that are set by economic (e.g., monetary evaluations of cost/benefit) or ecological (e.g., using ecological quantitative models) drivers, with iwi having little opportunity to contribute to decisions or to determine their own priorities.

'Ngā Repo o Kāwhia' is a collaborative research project between NIWA, the Maniapoto Māori Trust Board's (MMTB) Whanake Taiao (Environmental) team and the Ngā Tai o Kāwhia Regional Management Committee (RMC). This pilot study was an opportunity to test a participatory mapping methodology (using eBeam) and develop the first version of a 'framework' based on mātauranga-ā-hapū, values and uses. This process is ongoing and iterative, and the next phases of this work will include: supporting the Kāwhia RMC to prioritise the wetlands mapped throughout the project utilising the framework developed; and further refining both the framework and methodology with other RMCs in the Maniapoto rohe. The participatory mapping created an inventory of wetlands, while wānanga enabled the development of the first iteration of a strategic restoration framework.

Key knowledge holders were identified by the hapū from four of the five marae in the Ngā Tai o Kāwhia RMC rohe and contributed to the project via a series of wānanga and one-on-one interviews. The inventory of wetlands was primarily collated using eBeam interactive whiteboard technology. The wetlands identified and documented by Ngā Tai o Kāwhia whānau included a total of 86 sites, 27 of which were puna, 28 of which were repo. In addition, 31 other sites of significance were mapped that were either associated with the locations of the puna and repo, or important to the overall cultural landscape of the Kāwhia rohe. During the mapping and framework development process a total of nine different freshwater, wetland and estuarine fisheries species were identified as integral to these wetland sites.

Two social science techniques (Pebble Distribution Method and Scenario Cards) were used to explore the decision-making motivations of Ngā Tai o Kāwhia whānau. These methods helped the project team better understand the views, perceptions, and preferences of Ngā Tai o Kāwhia whānau. The co-development of the resulting strategic restoration framework (Figure 1-1) allowed for the incorporation of various criteria identified as important to Ngā Tai o Kāwhia whānau when prioritising wetland restoration efforts in their rohe. The three key decision-making influences were water related uses (Wai), food and harvesting activities (Kai), and other resources used in cultural

[1] http://www.waikatoregion.govt.nz/Council/Policy-and-plans/Rules-and-regulation/Regional-Plan/Waikato-Regional-Plan/

practices (Mahi). A fourth influence (Tāngata) included factors such as wāhi tapu, historical battle grounds, and physical and legal accessibility to wetland sites. These enhancing factors, which did not determine prioritisation alone, were shown to influence Ngā Tai o Kāwhia whānau decision-making when all other elements were considered equal.

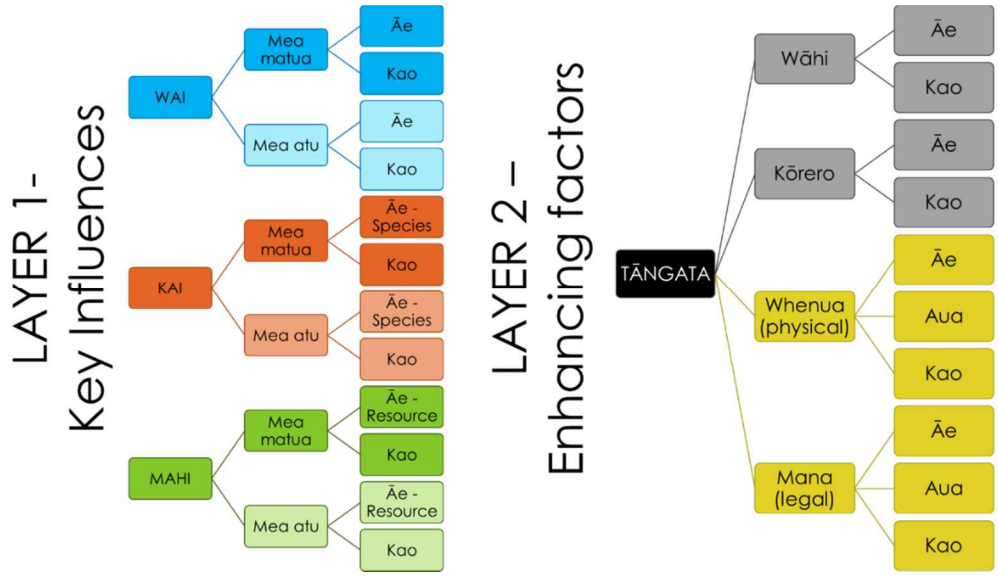


Figure 1-1: Conceptual representation of the structure of the strategic restoration framework developed.

Much of the focus of the framework itself is on the utility/uses of these sites (e.g., wai, kai and mahi), which could be misleading, suggesting that these are the only way in which hapū value and associate with their repo and puna. While usage and physical associations are often the most tangible way in which whānau can express their values, they are underpinned by concepts of mauri, whakapapa, manaakitanga and kaitiakitanga. Therefore, while this prioritisation framework has a basis in the described uses and associations to these sites, it is inherently driven by the desire to restore a more holistic sense of wellbeing for hapū.

This project provided space for Ngā Tai o Kāwhia whānau to express their aspirations for wetlands and the enhancement of important taonga species that utilise them. The framework enabled the prioritisation of wetland sites into three tiers indicative of the *order* of restoration, i.e., Priority 1 – restoration to occur as soon as is possible, Priority 2 – restoration to occur once one or two actions have been completed, and Priority 3 – restoration to occur after multiple actions have been completed and/or sites unable to be restored but maintaining the mātauranga for these sites is important. During the project a draft set of priorities was provided to the Ngā Tai o Kāwhia RMC participants as *an example* of how the framework could be used to prioritise their sites.

With a strategic approach to restoring wetlands within the rohe, both the RMC and MMTB are enabled to increase the effectiveness of restoration efforts based on *their* priorities. This inventory and framework are the first step towards restoration, with the overall aim of increasing wetland extent and function, in turn supporting enhanced fisheries habitat, and providing a full range of cultural and ecological functions. This pilot study has been a very positive step towards documenting and organising mātauranga on fisheries, cultural significance, uses and associations of repo and puna in the Kāwhia rohe. Once priorities are set by the Kāwhia whānau (i.e., in the ongoing work planned), both the Ngā Tai o Kāwhia RMC and MMTB will be enabled to be more strategically poised to undergo restoration at priority sites as funding opportunities arise.

1 Introduction

1.1 Wetland Restoration

Wetlands include a wide range of habitat types from freshwater stream margins, freshwater springs, swamps and bogs, to saltwater marshes, mangroves and estuaries (Johnson and Gerbeaux 2004; Maniapoto Māori Trust Board 2016). Wetlands perform vital ecosystem services such as improving water quality, reducing flood risks and trapping and removing sediment and nutrients (Tanner, Howard-Williams et al. 2013). Over the past 100 years wetland extent has significantly reduced with 10% across all of New Zealand and only 8.9% in the Waikato remaining almost a decade ago, when compared to pre-human extent (Ausseil, Gerbeaux et al. 2008). With this in mind, protection and restoration of remaining wetlands is paramount to ensure the full range of values are retained including habitats for taonga species, maintenance of cultural use and associations, as well as the benefit to ecological and hydrological function.

The effects of land use activities and developments such as the draining of wetlands, nutrient and sediment runoff from land, stock access and contaminants in waterways have been identified to impact significantly on mahinga kai areas (Maniapoto Māori Trust Board 2016). The wetlands, both repo (swamps) and puna (springs), within the Maniapoto rohe are part of the ancestral landscape and highly valued as sources of mahinga kai, including native fish, birds, indigenous flora and fauna and taonga species (e.g., harakeke, ducks, tuna, īnanga). These wetlands are also a key source of materials and resources for rongoā, raranga and whakairo and were important places to store and preserve taonga (Maniapoto Māori Trust Board 2016). The ability of Maniapoto to exercise kaitiaki responsibilities, maintain access to, and utilise the natural resources of wetlands must be maintained and enhanced.

The Waikato Regional Council (WRC) recognises Maniapoto holds concerns for wetlands as habitat for tuna fisheries in their Regional Plan[2]. However, the issue of declining wetlands has been felt much more broadly by Maniapoto (Tipa, Williams et al. 2014; Maniapoto Māori Trust Board 2015a; Maniapoto Māori Trust Board 2016). Iwi, primary industry, councils, non-governmental organisations, research institutes and community groups are all engaged in the restoration of wetlands. However, restoration of wetland ecosystems is often undertaken at priority sites that are set by economic (e.g., monetary evaluations of cost/benefit) or ecological (e.g., using ecological quantitative models) drivers at a political level (e.g., Regional Council), with iwi having little opportunity to contribute to decisions or to determine their own priorities. Additionally, often larger and higher profile wetlands (e.g., Whangamarino) can receive much attention (e.g., Ausseil, Gerbeaux et al. 2008), while sites of particular importance to iwi and hapū may be deemed less significant to the ecological landscape.

1.2 Maniapoto Māori Trust Board

The Maniapoto Māori Trust Board (MMTB) was established under the Māori Trust Boards Act 1955 to provide for Regional Management Committees (RMCs) pursuant to the Maniapoto Māori Trust Boards Act 1987 and to represent the people of Ngāti Maniapoto. The Maniapoto rohe encompasses seven RMCs with each representing a cluster of marae. The seven RMCs are: Te Nehenehenui, Hauāuru ki Uta, Te Tokanganui-a-noho, Ngā Tai o Kāwhia, Rereahu, Mōkau ki Runga and Tuhua Hikurangi.

[2] http://www.waikatoregion.govt.nz/Council/Policy-and-plans/Rules-and-regulation/Regional-Plan/Waikato-Regional-Plan/

The Maniapoto rohe incorporates the eastern boundary along the Rangitoto and Hurakia ranges, the western boundary with the Aotea and Kāwhia Harbours and extending 20 nautical miles out to sea, the northern boundary from Raukūmara to the Waipingao Stream and the southern boundary of the Tūhua Ranges. There are also shared boundaries with other iwi along the Wharepūhunga, Hauhungaroa and Tūhua Ranges.

Whanake Taiao is the MMTB's environmental team and was established in 2011. The team supports mana whenua in their kaitiaki roles and responsibilities and focuses on all environmental matters, and the implementation of the co-governance and co-management arrangements over the Upper Waipā River established in the Ngā Wai o Maniapoto (Waipa River) Act 2012 and the 2012 Co-Management Deed (Maniapoto Māori Trust Board 2015b).

1.3 Project Scope

There is currently no inventory or strategic approach to restoration for wetland sites that includes mātauranga-ā-hapū within the Maniapoto rohe, or specifically in the Kāwhia region. With the continued decline of wetland habitats, it is important for the iwi and hapū of Maniapoto to have:

- An inventory of wetlands, including what mahinga kai (including fisheries) were supported, what they were used for, where they are and how big they are/used to be.
- A process/framework to determine those of greatest priority to iwi and hapū for restoration for the return of fishery habitat, fisheries and cultural uses/associations.
- The ability to be strategic about how restoration funding is spent, and advocate/influence restoration funding of other agencies to support the restoration of fisheries and cultural uses.

This project developed out of the need to capture the mātauranga-ā-hapū surrounding wetlands, and develop a new decision-support tool to help prioritise the order of restoration given limited resources. The establishment of where culturally significant wetlands are, what uses were/are associated with them, and how Maniapoto might strategically go about restoring them is the first step towards enhancing cultural use and associated mahinga kai habitats. The potential increase of wetland extent and socio-ecological function should also provide environmental benefits such as: nutrient, sediment and flow attenuation (Tanner, Howard-Williams et al. 2013). Additionally, the protection and restoration of wetlands will in turn provide for the uses, associations, resources and opportunities that Maniapoto once enjoyed at these sites (Tipa, Williams et al. 2014; Maniapoto Māori Trust Board 2015a; Maniapoto Māori Trust Board 2016). With this in mind, the team sought to pilot a new method of participatory mapping with hapū participants and co-develop a fresh approach to the prioritisation of actions based on mātauranga-ā-hapū. Specifically, the two key objectives of this project were:

1. to *pilot* a spatial inventory of existing and/or historical wetland locations based on mātauranga-ā-hapū using GIS, and documenting fisheries, cultural significance, use and associations, and

2. to *trial* the development of a framework that reflects the priorities of the Ngā Tai o Kāwhia RMC participants for wetland restoration.

This project also supports the key objectives around wetlands within the Maniapoto Iwi Environmental Management Plan (Maniapoto Māori Trust Board, 2016: Section 15.3) as well as supporting Maniapoto whānau in their aspirations for strengthening kaitiakitanga and cultural wellbeing associated with their landscapes.

1.4 The Project Team

To successfully execute the project a collaborative project team was established with members from both NIWA and MMTB. This brought together skills in GIS, participatory mapping, the use of interactive mapping technology (eBeam), interviewing and facilitation.

The core project team consisted of members of the MMTB Whanake Taiao team including Ngahuia Herangi (Project Manager, Coordinator, and Facilitator), Shannon Te Huia (GIS Analyst, Videographer), Wikitoria Tane (Interviewer), and Kelly Ratana (NIWA Environmental Scientist, GIS Analyst, and Facilitator). The project team was also supported throughout by other MMTB staff Tipene Wilson, Kura Stafford, Titahi Tarawa, Jo Kukutai, and NIWA staff Kate Davies, Sanjay Wadhwa, Aarti Wadhwa and Erica Williams.

1.5 Structure of the Report

The report provides an overview and introduction to wetland restoration and the project objectives, scope and team (Section 1). We then detail the methodology used, including engagement, mapping and the process used to co-develop the framework with our partners (Section 2). The report then focuses on the results of mapping, before outlining specifically the results of activities used in developing the draft framework, finally presenting the framework developed for consideration (Section 3).

Given that this project was a pilot study to explore an innovative mapping approach and to co-develop a framework that would support Maniapoto to direct wetland restoration efforts, the discussion section (Section 4) provides some insight into the key learnings that came out of the project. A glossary of the Te Reo and acronyms used in this report is provided in (Section 6).

Lastly, a suggested step through guide to using the framework was used developed to help explain the process of prioritising (Appendix A).

2 Methodology

The process followed during the project included the participatory mapping of wetlands (between June and October 2016), and the creation and development of a strategic priorities framework to direct restoration efforts (November to December 2016). Figure 2-1 outlines the project work flow and the key components undertaken by the project team with our partners, the Ngā Tai o Kāwhia RMC.

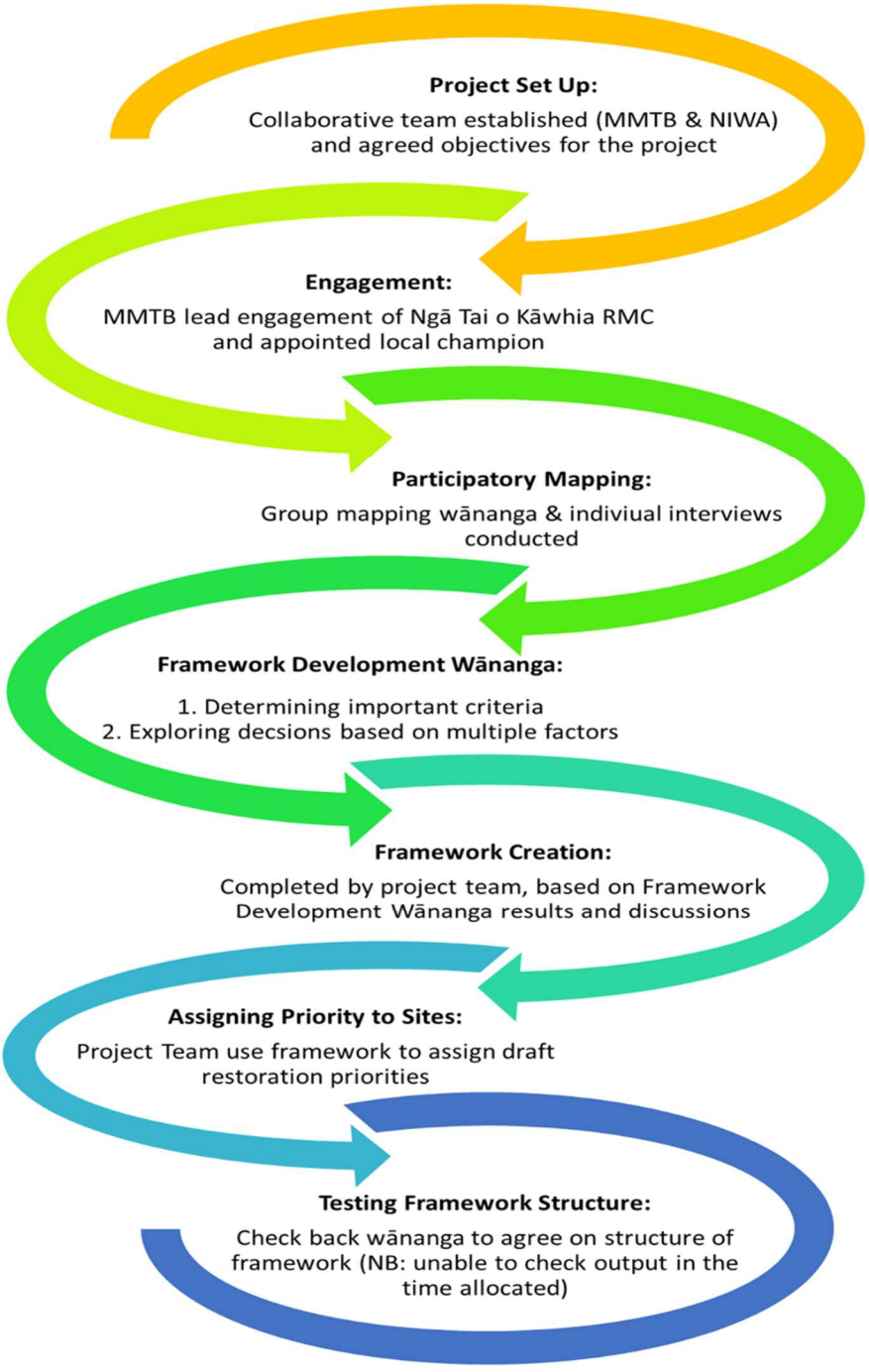


Figure 2-1: Key steps completed during the project.

2.1 Engagement with Ngā Tai o Kāwhia RMC

Engagement was initiated by the MMTB Whanake Taiao team, first by emailing the RMC to gauge interest in the kaupapa, and requesting to present at their monthly meeting. When attending the RMC monthly meeting the project team (both NIWA and MMTB) introduced the project, described the objectives and outlined the need for a 'local champion' to help guide and assist the project team in organising and implementing the project. Following this the RMC was provided time to consider the project and its benefits prior to committing to the process. Once agreement to be involved was confirmed, a local champion (one of the RMC members) liaised with the project team to organise logistics, contact iwi members to participate in participatory mapping interviews and to help organise locations for the work outlined below. The local champion role was key in recruiting interviewees (Levine and Feinholz 2015), but also helped to keep both the RMC and broader iwi members informed of the project and socialise the project among whānau.

Throughout the project there were multiple opportunities for the hapū members to be in contact with the project team and ask questions, seek clarifications and provide feedback to the outputs from the work. This included multiple check back opportunities (both group and individual) with participants over mapped sites, information shared and the way that the framework was developed. This was intentional and is necessary in a collaborative project, especially when working with mātauranga-ā-hapū.

This project was mindful of properly providing for ethical procedures for working with mātauranga, and was guided by MMTB Whanake Taiao team throughout the process to abide by Maniapoto tikanga and kawa. This included discussions regarding the process of recording and appropriately handling and sharing knowledge. This process was discussed at the introduction meetings with whānau and agreed upon by the project team (NIWA and MMTB) whereby all primary outputs (e.g., voice and/or video recordings) would be held securely by MMTB. Secondary outputs (e.g., maps produced, GIS files, reports) could be held by both parties, with sharing external to the project occurring only with appropriate permissions (e.g., information regarding locations of puna would be decided on a case by case basis by whānau and MMTB).

2.2 Participatory Mapping and Data Collection

Participatory mapping was the key qualitative method used to collect data throughout the project. The project included interviewing kaumātua and identified knowledge holders in both group and one-on-one semi-structured interviews (either using digital or paper-based maps) to gather information regarding the location, size and significance of each site (e.g., fisheries, function, cultural use, names, historic stories). Some sites mapped were not repo or puna but were still captured as they represented other sites of importance within the Maniapoto cultural landscape. Throughout the project five key knowledge holders were interviewed and information from two further previous interviewees was obtained.

2.2.1 eBeam Mapping

Participatory mapping approaches (including paper maps, aerial/satellite imagery, Global Positioning Systems) have long been used in social sciences to 'spatially document community knowledge about places' (NOAA 2014). Participatory mapping is also recognised as a platform to visually integrate both local and indigenous knowledge with scientific knowledge (Levine and Feinholz 2015). Although participatory mapping is recognised as a useful means of contributing spatial data to inform understanding of human-environment interactions (Levine and Feinholz 2015) and to support

decision-making (NOAA 2014; NOAA 2015), the more modern mapping technologies, such as eBeam[3] have little known application in New Zealand. The United States National Oceanic and Atmospheric Administration (NOAA) has developed a methodology utilising this specialised technology over the past ten years which aimed to better capture ocean use patterns of diverse coastal communities (NOAA 2014). While initially this approach was developed for ocean use mapping, NOAA note that the process is intended to be flexible and adaptable for any region to address multi-scaled management decisions (NOAA 2014).

The process for workshops utilising this participatory mapping approach usually follow the format of an introductory presentation and a hands on demonstration of functionality, followed by mapping breakout sessions (dependant on the number of participants and/or whether they are individual or group mapping sessions) (NOAA 2014).

Two key roles within the mapping breakout sessions are identified as (p 7, NOAA 2014; Levine and Feinholz 2015):

- Process facilitator – who is responsible for controlling the workflow and semi-structured interviewing of each participant (and group dynamics in group mapping sessions) in the breakout sessions during the workshop.

- GIS/Technical facilitator – who is responsible for running the mapping software (e.g., ArcGIS[4]) during the workshop and guiding participants through the base map (e.g., zooming in and out, preparing shapefiles to be edited), capturing the information shared by participants; may also be assigned post-processing tasks.

The eBeam interactive whiteboard technology, allowed participants to 'digitise-as-you-go' within the mapping sessions. This was done using a projected image of the base map (either Topo50 or aerial imagery) in the ArcGIS mapping software to visualise the mapping area (Levine and Feinholz 2015) and a stylus (a pen-like mouse that is able to draw onto the projected surface). This allowed the active participant to either direct the process facilitator, or digitise geodatabase features (map sites) on-the-fly directly into the GIS software (Figure 2-2) (Levine and Feinholz 2015). Through the interactive whiteboard technology, mapping conducted on the projected surface was captured directly within the ArcGIS system on the connected laptop as was the mātauranga shared about sites. The ability to navigate (zoom in and out, fly to multiple places on a map) within the area of interest and map sites in various locations, of various shapes and sizes, as well as at differing scales of interest has been noted as a major advantage of this type of participatory mapping (Levine and Feinholz 2015).

[3] A interactive whiteboard technology eBeam Edge, developed by Luidia Inc. http://www.e-beam.com/home.html
[4] A Geographic Information System (GIS) software created by ESRI http://www.esri.com/arcgis/about-arcgis

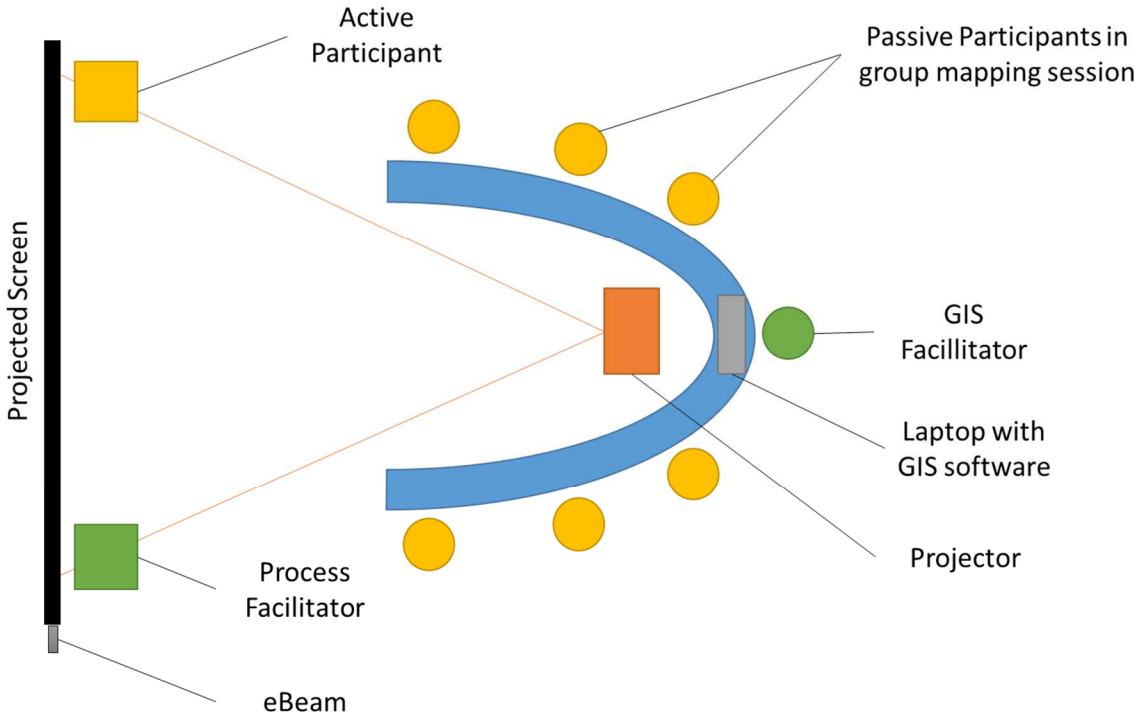


Figure 2-2: Example of set up for group mapping session adapted from NOAA (2014), Levine and Feinholz (2015). In group sessions, there will be active participants (those who are doing the mapping with the stylus or facilitator) and passive participants who may contribute suggestions but do not hold the stylus. In individual sessions, there are no passive participants, however, the room set-up is the same.

While the eBeam technology and its application in this project was one of the key things the project team wanted to test, it was also important to consider the technical capacity of the participants and their comfortability with this technology (NOAA 2015). In an effort to balance the comfort level of our participants, we ensured time for a hands on demonstration at the start of each session (Levine and Feinholz 2015), and we also had multiple A0 size printed topographic maps available to support both orientation of the participants to their location on the projected map, or as an option for all mapping if preferred.

2.2.2 Mapping Wānanga

In June 2016, a two day wānanga was held at Mōkai Kāinga marae in Kāwhia. Following pōwhiri, the project team gave an introductory presentation to provide the context and purpose of the project to those in attendance before initiating the mapping session. A short hands-on demonstration of the process to draw shapes on the projected map was provided followed by participant mapping. This wānanga had a total of 13 attendees throughout the first day. Unfortunately, there were several factors limiting both attendance and participation during this time including, but not limited to, tangihanga (funerals), competing events, and timing. Two key kaumātua and knowledge holders were interviewed during this wānanga, with some passive participants also contributing. The mapping session was both audio and voice recorded for the records of whānau and MMTB.

Following this first day wānanga, the research team and one of the local kaumātua went on a field visit to some of the mapped sites around Mōkai Kāinga marae. During the field visit further details about these sites were shared and recorded by the project team.

2.2.3 One-on-one Interviews

Following the mapping wānanga and considering the small number of participants interviewed, the project team proceeded to conduct individual interviews with three further identified knowledge holders. These mapping sessions were conducted solely using the eBeam approach detailed in Section 3.2.1. Additionally, one of the mapping wānanga participants requested to take a large printed paper map of the area and have one of the project team meet to discuss at a later date after checking with their own personal maps. Two follow up meetings were organised to complete the paper-based mapping with this participant.

2.3 Strategic Framework Development

The framework for prioritisation was developed through two wānanga held in November and December 2016. These wānanga were held at the MMTB office in Te Kūiti and included attendance from most interviewees, three other identified knowledge holders from the Kāwhia rohe, the project team, and were facilitated by NIWA Scientist Kelly Ratana. The purpose of these wānanga was to explore the data collected during the wetland inventory mapping, and to explore two key questions:

1. What are the key uses, associations and characteristics of repo and puna that are important to whānau and which are more important relative to others?

2. How do whānau assess multiple factors (e.g., both cultural use/associations and access/willingness) to prioritise restoration efforts that utilises their mātauranga-ā-hapū?

The main objective was to collaboratively create and refine a strategic framework for prioritisation that appropriately reflected how/in what order hapū would like restoration of wetlands to occur. The first wānanga involved a total of eight knowledge holders and elders participating in both a scoring and scenario analysis activity (see Section 3.3.1 and 3.3.2) to seek underlying decision-making motivations and support the development of the initial framework idea. The initial framework idea didn't quite emerge in the time allocated to wānanga one; however, the participants challenged the project team to develop a draft framework and initial output priorities, that were then presented back and tested with the whānau at the second wānanga. These wānanga were also an opportunity to check back with the knowledge holders to ensure the accuracy and completeness of the data collected to their satisfaction (NOAA 2015), and provide a final opportunity to add to the data set.

Within the framework development wānanga we first provided a brief re-introduction presentation to all participants and re-iterated the objectives (Section 1.1) of the pilot study. This was then followed with two social science techniques to explore the decision-making motivations. Both methods were utilised to help structure conversations and seek out the 'why' behind the decisions and priorities of whānau to support the development of an overall framework for prioritising restoration efforts.

2.3.1 Wānanga 1 – Framework Development

Determining Important Criteria

The first activity included a scoring exercise, which has also been referenced as the Pebble Distribution Method (Colfer 1999; Lynam, de Jong et al. 2007). Scoring has been used to better understand community views and perceptions, and to seek out community preferences (Sheil and

Liswanti 2006). This technique offers a simple but effective methodology that reveals insights and preferences, while also clarifying understandings and values of the participating communities (Sheil and Liswanti 2006; Lynam, de Jong et al. 2007). This was important when seeking to develop a mātauranga-ā-hapū based framework to direct restoration efforts and determine important criteria.

From each of the mapping interviews, the research team drew out key species, practices, associations and uses mentioned as initial categories for the scoring exercise. This list was not considered exhaustive but was presented to the participants to amend or add any further categories prior to and during the scoring exercise (Figure 2-3).

Figure 2-3: Participants conducting scoring while the facilitator adds categories suggested by participants.

For the scoring exercise, each participant was given an equal number of 'dots' (stickers to add to the categories on the wall), which exceeded the total number of categories available. This was to enable the participants to place at least one dot for each category, but also to ensure the opportunity to place more than one dot on at least one category. It was also done to ensure that each participant had enough dots if extra categories were suggested by participants during scoring. No restrictions were placed on where/how participants placed or 'spent' their dots across the categories. After the dots were spent (Figure 2-4), each of the participants was given the opportunity to talk about where they had placed their dots, and more importantly why they had placed them in each category (Lynam, de Jong et al. 2007).

Figure 2-4: All dots allocated after our scoring exercise during the first framework development wānanga.

Exploring Decisions with Multiple Factors

The second activity included the use of scenarios, which are a way of imagining possible futures and how decisions may be played out (Schoemaker 1995; Schwartz 1996). Scenario's are often used in scenario planning (Schoemaker 1995) but have also been referenced as scenario learning (Duinker and Greig 2007) and scenario-thinking (Stewart, French et al. 2013). These terms collectively talk of scenarios as a method to help guide future thinking, as a powerful tool that enables 'what if' questions to be explored in uncertain circumstances and to inform analysis and deliberation of possible futures (Schoemaker 1995; Schwartz 1996; Duinker and Greig 2007; Stewart, French et al. 2013). Scenarios have been suggested as a way to support decision-making and encourage robust discussion around 'value issues', where the decision makers need to think through their preferences and values (Stewart, French et al. 2013). While it is not a silver bullet it can be a very useful tool to allow creative thought and to frame strategic converstaions (Schwartz 1996; Peterson, Cumming et al. 2003; Stewart, French et al. 2013).

Our hypothetical scenarios were used to shift thinking away from a predictive future (i.e., what is most likely to happen) and without focussing soley on barriers to restoration, explore decision-making motivations behind how wetland restoration might be prioritised based on mātauranga-ā-hapū. This meant that key aspects such as the cultural values held by the participants were paired with the realities of feasibility (e.g., access).

Four hypothetical scenarios were constructed, each corresponding to one site that would be prioritised (Figure 2-5). This provided an appropriate number of scenarios to expand thinking without too much complexity (Schwartz 1996; Peterson, Cumming et al. 2003). Each scenario aimed to toggle four key elements: cultural uses of a site (e.g., mahinga kai or rongoā species harvest), access to the site (both physical and legal), the willingness of land owners to participate/co-operate in restoration efforts, and the intangible associations to the site (e.g., wāhi tapu or sacred sites). In addition to this, one scenario sought to tease out if 'rarity' might be an influencing factor in deciding priorities (Rare Gem). The scenario sites were named to evoke the key features being explored and to help communicate and discuss the scenarios (Peterson, Cumming et al. 2003).

The scenario narratives (Figure 2-5) for the four sites are briefly described as follows:

- The '**Watering Hole**' described a site with no known past or present cultural uses associated but was used to water stock, with medium accessibility and a ready willingness even though it is on private land.
- The '**Rare Gem**' described a site where a rare species considered a delicacy was found, with associated kōrero around taonga storage and preservation, with unknown but likely restricted willingness for access and with difficult accessibility.
- The '**Sacred Hub**' described a site that had many known uses for gathering important cultural resources and associations to sacred places, was physically very inaccessible but with a high willingness from the land owner to provide access.
- The '**Chiefly Spring**' described a site that was very important for the use of drinking water, had an important tribal association with the chiefly lineage and historic battle grounds, was very accessible but with a land owner who was unwilling to provide access.

Figure 2-5: Laminated scenario cards provided to participants with whiteboard pens to note from 1 – 4 the order they would prioritise restoration of these scenario sites.

The participants were given a laminated sheet of paper (Figure 2-5) which had all four scenarios on it and a whiteboard marker. They were asked to think of five years from now, where funding was available to conduct restoration and asked to order the four scenario sites from first to fourth priority for restoration (Figure 2-6). Each participant was then asked to share their reasons why they decided on their selected order of restoration.

Figure 2-6: Participants deciding on their priority order for restoring the four scenario sites in the first framework development wānanga.

2.3.2 Creating the Framework

The intention of the structured activities during the framework development wānanga, was to explore the criteria (and their relative importance) and to delve into how and why whānau might decide priority based on different packages of information in the scenarios. This helped the project team to better understand the components that might be most important to hapū when prioritising restoration efforts for wetlands in their rohe.

The approach to exploring interviews and data collected to discover emerging components of the framework also drew on the idea of 'grounded theory' (Glaser and Strauss 1967), in that the overall framework was shaped by themes emerging from the data collected during the mapping sessions. The knowledge shared by participants was analysed together with them to seek out the 'emerging' themes that eventually shaped the framework, as opposed to the data being 'force' fitted into a pre-conceived framework.

In creating the framework, the project team drew on ideas from various social science techniques including some aspects of multiple criteria decision analysis (MCDA). The strength in this method is that it "seek[s] to take explicit account of multiple criteria in helping individual or groups explore decisions that matter" (p. 2, Belton and Stewart 2002). This approach has been described to enabled more structured discussion in resource management (among other issues) and offer a process to create more robust and transparent decision-making (Belton and Stewart 2002; Mendoza and Martins 2006).

2.3.3 Wānanga 2 – Testing the Structure of the Framework

At the second wānanga, the project team sought to test the structure of the framework with the participants. Ensuring that hapū were comfortable with the process, able to alter the framework, could make sense of it themselves and felt their contributions were accurately represented were important to the project team. The structure of the framework and the overall matrix (see Section 3.5) was presented to the participants, followed by time for questions and suggestions as to how the framework did or did not represent a decision support tool they could be comfortable with. During this open discussion participants were encouraged to critique the framework, to alter or amend its structure or if desired to suggest a completely different structure that better suited them.

Additionally, the project team had utilised the prioritisation framework to create a 'draft priorities' output to share with the participants; however, due to time constraints the output *results* were not scrutinised by the participants in this wānanga. It was the intention of the team to demonstrate how the framework worked, to test that the structure captured appropriately the key components discussed in wānanga one, and to provide the participants with a first draft of priorities only. We anticipate that Ngā Tai o Kāwhia RMC and MMTB will work together to create the final output priorities in the future.

3 Results

3.1 Inventory of Wetlands

There are five marae in the Ngā Tai o Kāwhia RMC rohe and representatives of four of those marae were interviewed throughout this project. Five key knowledge holders from the area were interviewed specifically for the project, with some of the Taonga Register[5] interviewees also attending the wānanga and helping to develop the framework as well as corroborate mapped sites. Overall, a total of eight knowledge holders contributed to the project.

The inventory of wetlands documented included a total of 86 sites, 27 of which were puna, 28 of which were repo. In addition, 31 other sites of significance were mapped that were either associated to the locations of the puna and repo or important to the overall cultural landscape of the Kāwhia rohe. We intentionally did not restrict the type of knowledge that was collected during the mapping sessions and often participants expressed the desire for this broader knowledge to be captured so that it was not lost. All sites mapped were provided in digital and printed format to MMTB for distribution to the RMCs (for an example see Figure 3-1).

[5] An ongoing and seperate project that the MMTB Whanake Taiao team are conducting with iwi members to capture a much broader set of knowledge realted to their cultural landscape.

Figure 3-1: Example of the maps created from the mapping sessions with participants. Data collected was spatially explicit, numbered and referenced to the specific details provided about the values, uses and associations to that site.

3.2 Aquatic Fisheries

During the mapping and framework development process there was many freshwater, wetland and estuarine fisheries species that were identified as taonga species to the whānau at Kāwhia. Table 3-1 provides a full list of Māori and/or common names as well as scientific names where possible, for the species documented during both the mapping interviews and framework development wānanga. The fish and shellfish species harvested from the repo identified during our mapping interviews, form an integral component of the cultural value of these ecosystems and helps to demonstrate why the wetland components of the landscape have been referred to as highly valued traditional fisheries habitat for many iwi (Maniapoto Māori Trust Board 2016; Taura, Schravendjik-Goodman et al. 2017). Many of the participants emphasised the importance of, and current rarity of kueke/koeke and ngorongoro as delicacies; however, all species were highlighted as important fisheries utilising the wetland habitat.

Table 3-1: List of fisheries species documented as important to the Ngā Tai o Kāwhia RMC whānau. This list is *not* considered exhaustive and is a representation of the species spoken about by those whānau able to participate in our research. Other whānau members may continue to add to this list. Often the Māori names reference different life stages and so it is not always possible to know the exact scientific name for each species described, scientific names are offered where possible.

Māori and/or common name	Scientific Name
Pātiki, flounder	*Rhombosolea plebeia*
Kueke/Koeke (shrimp)	
Ngorongoro (small black mussels)	
Peraro (thin shelled pipi)	
Piharau, lamprey	*Geotria australis*
Pupu, cat's eyes	*Turbo smaragdus*
Tio, oyster	*Saccostrea glomerata*
Tuna, tuna repo, eel	*Anguilla australis* (shortfin), *Anguilla dieffenbachia* (longfin)
Tuna Puhi	
Whitebait (multiple species)	*Galaxias maculatus* (īnanga) *Galaxias brevipinnis* (kōaro) *Galaxias fasciatus* (banded kōkopu) *Galaxias argenteus* (giant kōkopu) *Galaxias postvectis* (shortjaw kōkopu)

3.3 Scoring Exercise

Initially from the mapping interviews a total of 29 categories were identified which included uses, harvested species, historical associations and stories, wāhi tapu, as well as associated landscape features (e.g., burial caves nearby). During the scoring activity, a further seven categories were added including the addition or distinction of tuna puhi within the tuna category, ngorongoro, kueke/koeke, piharau, oysters, whenua and all native plants. During the discussions following the scoring, an element of legal access to lands was also raised and was added as a consideration with the term 'mana'[6] during the framework development by the project team.

The highest scoring category was drinking water with a total of 28 dots allocated across all eight participants, followed by 19 dots for two species identified as most important, whitebait and tuna (including the combined score given to tuna and tuna puhi) (Figure 3-2). Across all the uses and associations that were scored, the participants and project team began to see three key use

[6] NB: this type of mana refers specifically to the 'legal authority' to access lands in the current legal system and does not seek to undermine or diminish the mana motuhake or inalienable authority that the hapū of Kāwhia have over all of their lands.

elements emerge which included ‘Wai’ (water associated uses), ‘Kai’ (food and harvesting associated uses), and ‘Mahi’ (other harvesting and practices for example plants used for weaving or medicinal purposes) (Figure 3-2). While there was clear evidence that all categories were important to participants (i.e., all categories received at least four dots), which was reiterated during the discussion following scoring, there were some categories that received slightly more dots than others. Using an arbitrary cut off of 10 dots, all categories within the larger groupings of Wai, Kai and Mahi that received 10 or more were considered as ‘mea matua’ (most important/dominant components) or the key uses and species of a wetland that were felt collectively to be important. Those categories that received less than 10 dots, were considered ‘mea atu’ (other components) or the other uses and species that while still integral, were perhaps slightly less important.

A fourth key grouping that emerged during the scoring activity was the ‘Tāngata’ or people-focussed element, which included not only the ability to access the landscape and these sites, but broader features of the cultural landscape associated to these sites. Within the Tāngata grouping, no arbitrary cut off was used as it was felt that these associations were important enhancing factors in the consideration of these sites. It is important to note that while both the mapping and framework were founded on the knowledge held by the hapū members who participated, the key reality of access (both legal and physical) was repeatedly raised, and was also supported by the ‘whenua’ category scoring the highest with 13 dots.

The results of the scoring were interesting as a visual representation for the participants of the collective key criteria of importance when considering their wetland sites. This activity also stimulated discussion which confirmed that for the Ngā Tai o Kāwhia whānau, two of the most important features of their wetlands were a source of drinking water for both humans and other animals (puna) and as a food source (repo). Additionally, some of the conversations highlighted a slightly gendered response where many of the female participants also highlighted the importance of repo in particular for resources to do with raranga (weaving) and rongoā (medicinal purposes). While the male participants supported the importance of raranga and rongoā, they also emphasised the importance of the historical iwi kōrero, battle grounds, traditional pā sites and burial sites.

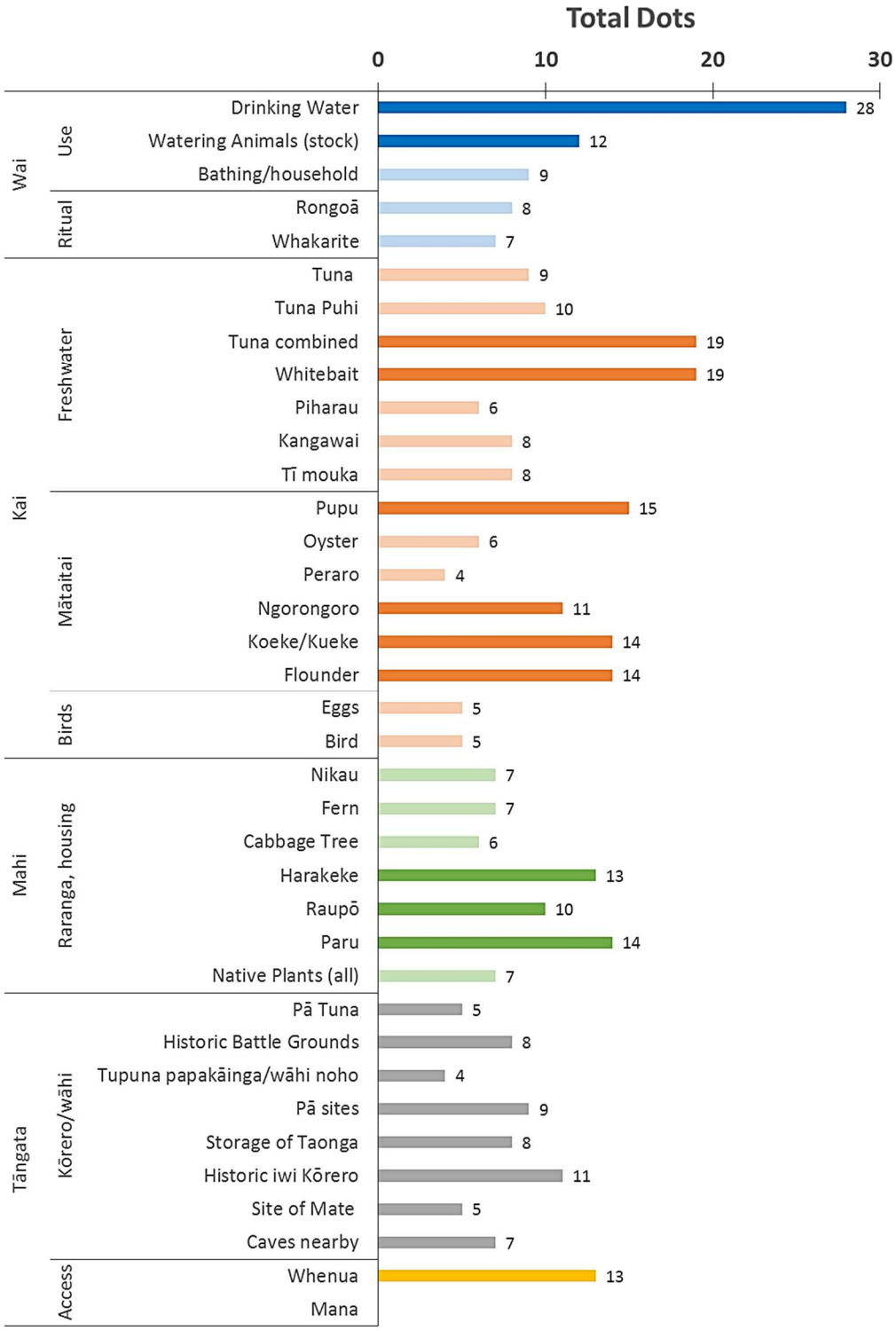


Figure 3-2: Bar graph of the total number of dots allocated to each category during the scoring exercise. The bars within the groups of 'Wai', 'Kai' and 'Mahi' that are shaded in darker are considered the key categories within each of the larger groupings identified. Within the grouping of 'Tāngata' the 'mana' category, (which in this context is used to address the ability to legally access wetlands through land ownership) was added during the framework development by the *project team* not during the framework development wānanga with participants, hence it wasn't allocated any dots in this scoring activity; however, legal access was encompassed in the discussions around the 'whenua' category.

3.4 Scenario Cards

The scenario activity showed that for most of the participants, the sacred hub was the site that would take a higher priority, followed closely by the chiefly spring, the watering hole and lastly the rare gem (Figure 3-3).

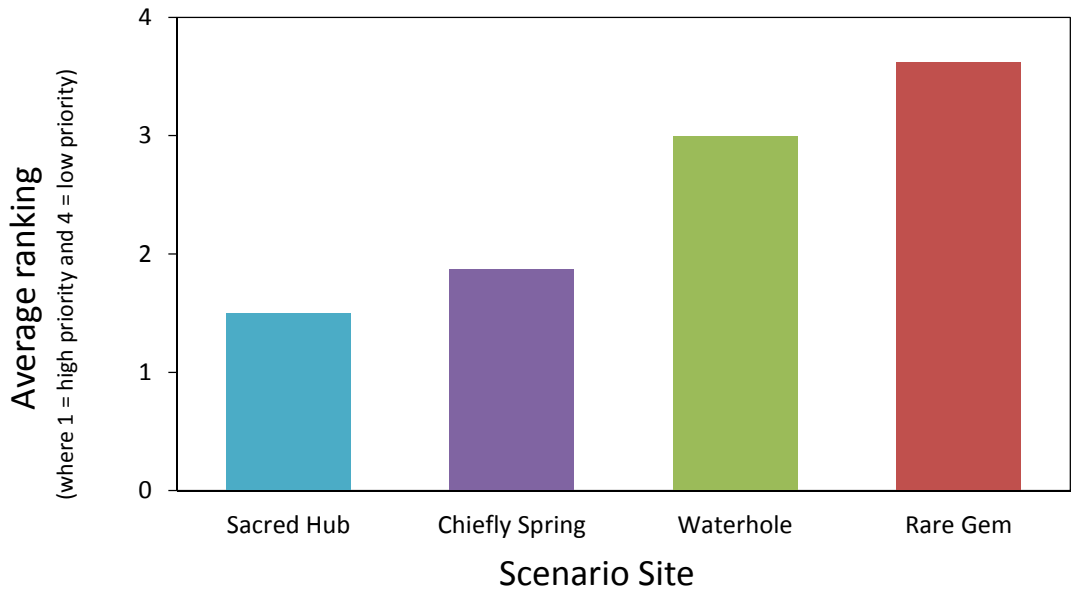


Figure 3-3: The average ranking of each of the hypothetical scenario sites prioritised by participants. Showing the average rankings given to each scenario site where the sites were ranked with a 1 = first priority and 4 = last priority.

There was no clear agreement across all participants on the order of priority as shown in the individual rankings (Table 3-2), however, collectively both the sacred hub and chiefly spring were consistently ranked in the top two. Many participants referenced the dependence of their people on the harvest from sites like the sacred hub, and the vital need for water from sites like the chiefly spring. This further supported the two key themes that came out of the scoring exercise. Interestingly, the waterhole scenario was often ranked higher than the rare gem with reasons often referencing the importance of stock as a livelihood. This was coupled with the rare gem by default being ranked fourth or being ranked as a lower priority due specifically to a lack of concern over the kākahi (freshwater mussel, the fictitious delicacy used in the scenario) as it was not considered a delicacy in the Kāwhia area. However, participants felt if the species in the rare gem scenario was the koeke/kueke (a rare delicacy in Kāwhia), this would elevate the importance and priority of that site.

A further interesting point from discussions following the scenario site prioritisation was around both willingness of land owners to provide access and physical accessibility of the sites for restoration. While land owner willingness was referenced by a few participants, majority felt that there were ways to work alongside and build relationships with land owners to achieve restoration goals with comments like “we are good negotiators you know!” (Participant, framework development wānanga, 2016). While this was acknowledged to require time and still needed to be considered in prioritisation, it was felt not to impact heavily on decisions. Further to this, physical access was felt to be only slightly important, with few participants noting that this influenced their decisions for priority order. Overall there was a sentiment that much of the land was owned by either Māori or

longstanding community members, and if restoration was going to occur at a more difficult to reach site, access issues could/would be overcome.

Table 3-2: Individual participant rankings for prioritising the four scenario sites during the scenario activity of the framework development wānanga.

Participant	Sacred Hub	Chiefly Spring	Watering Hole	Rare Gem
A	1	3	2	4
B	2	1	4	3
C	2	1	3	4
D	1	2	3	4
E	2	1	3	4
F	2	1	3	4
G	1	2	4	3
H	1	4	2	3

3.5 The Strategic Restoration Framework

During the first framework development wānanga, participants agreed on four major themes or elements that emerged from the activities and knowledge shared, including 'Wai', 'Kai', 'Mahi', and 'Tāngata'. Although the initial framework was not reached with participants during the first wānanga, the participants issued the project team with a wero (challenge) to go away and create a framework that captured the essence of these four elements and the deliberations of the day, and come back to the second wānanga with 'an answer' to the question, what could a framework to strategically direct and prioritise restoration efforts of wetlands based on mātauranga-ā-hapū look like?

The project team drew on the grounded theory approach and the emergent themes identified, as well as the structure of a multicriteria decision analysis matrix (Proctor and Drechsler 2006), to developed a deliberative matrix. In this context, we define 'deliberative matrix' (or framework) as a tool that structures the mātauranga shared by participants, in a format grounded in the emergent key criteria defined with participants, that supports the viewing of all information available for deliberation and consideration together, to guide the assignment of priority for each site. In this way, the matrix provides a way to consider sites meeting key criteria identified (e.g., taonga species and/or spiritual associations) so that priority can be considered across all criteria *and* among all sites simultaneously.

The matrix developed enabled the prioritisation of wetland sites into three tiers indicative of the *order* of restoration, i.e., Priority 1 – restoration to occur as soon as is possible, Priority 2 – restoration to occur once one or two actions have been completed, and Priority 3 – restoration to occur after multiple actions have been completed or sites unable to be restored but maintaining the mātauranga for these sites is important. The matrix did not utilise automated quantitative scoring algorithms to set site priorities into a linear ranked list, opting instead to encourage deliberation of

the qualitative information presented, to group sites into the three tiers of priority. This involves the assigning of priority through interaction with the strategic restoration framework itself and decisions made by hapū members.

A conceptual framework of the strategic restoration framework was initially developed from the first wānanga (Figure 3-4), which shows two key 'layers' inherent in the framework. The first being the key themes influencing whether a site would be prioritised which grouped the criteria discovered through scoring. In this layer, Wai and Kai were the two most important themes, but Mahi was also identified as influential. The second layer included the Tāngata theme, which while often did not determine priority alone, could influence priority, all other elements considered equal. The Wai, Kai and Mahi elements were split again into what might be considered qualitatively weighted categories of 'mea matua' (the main uses/species/values identified) and 'mea atu' (the other uses/species/values). Important to note is the species or resource within the Kai and Mahi criteria are named within the framework. These were noted explicitly to ensure hapū decision makers were aware of the presence of rare species of importance at sites. This is important when, for example, a site is identified to contain a rare taonga (treasured) species (e.g., kueke/koeke) and therefore may become a higher priority for restoration.

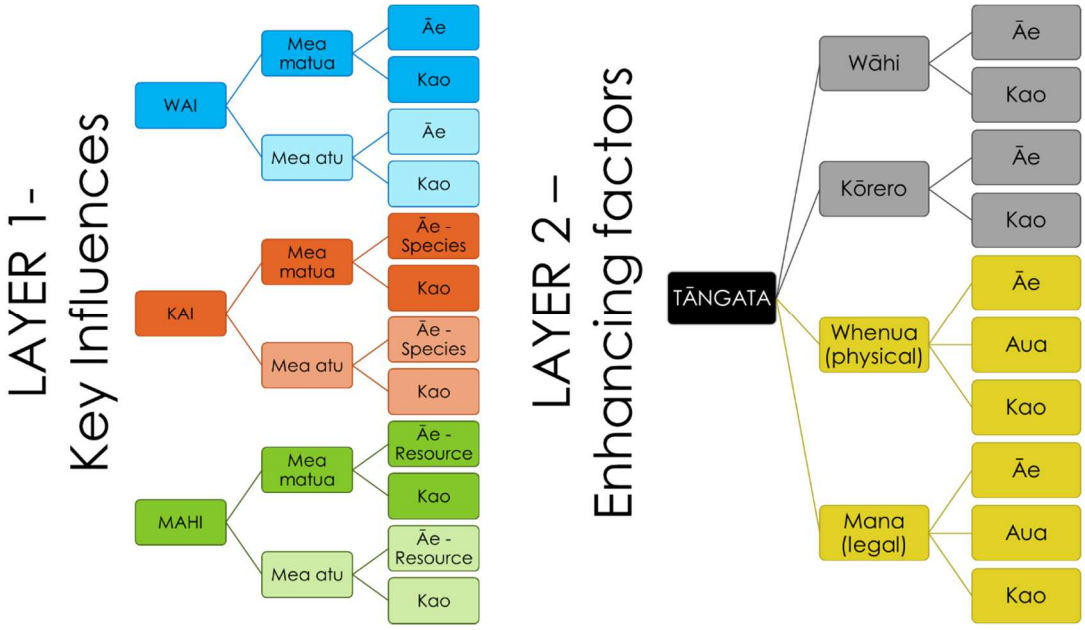


Figure 3-4: Conceptualisation of the strategic restoration framework developed to prioritise restoration efforts with the Ngā Tai o Kāwhia RMC.

The conceptual framework was then converted into a multicriteria deliberative matrix (Table 3-3) within which to view the information shared. In addition to the elements provided in Figure 3-4, three other columns were added. This included one called 'Mea Motuhake' which provided space to explicitly note any 'unique' or 'special' things that might elevate the priority status of a site according to the hapū (e.g., a site identified as the only site where a very rare species is found or a site where the *best* harakeke (flax) might be harvested in the rohe). The two final columns included the priority tier assigned (from 1 – 3) and space to provide a brief reasoning as to why this site was given that priority.

Within the matrix, when populated, each site mapped occupied one row and both the 'Ingoa' and 'Description' were taken directly from the GIS layers created during the mapping sessions. The overall ID was matched to that within the GIS attribute table to maintain the link to the spatial information for each site. For more details on populating the matrix please see Appendix A: How to use the Framework.

Table 3-3: Example of the matrix developed to input mātauranga shared for each of the mapped sites. Please note 'Site 1' is a fictitious example of a wetland site. The information shared in this table may be an abbreviated version of what is housed in the attribute table of the GIS layer or in transcripts or recordings from interviews.

Overall ID	Ingoa	Description	Repo/Puna/Other	WAI	MEA MATUA	MEA ATU	KAI	MEA MATUA	MEA ATU	MAHI / USES	MEA MATUA	MEA ATU	WĀHI	KŌRERO	WHENUA	MANA	MEA MOTUHAKE	PRIORITY?	WHY?
Site 1	Te Puna	Puna used for drinking water, also site where patu was found	Puna	Āe	Āe		Kao			Kao			Kao	Āe	Āe	Kao		2	Site important for water, taonga found, but legal access required first
Site 2																			

3.5.1 Testing the Framework Structure

The team presented the draft structure of the strategic restoration framework to participants and received much positive feedback, with all participants agreeing that this framework made sense to them and captured the important aspects of the discussions held during the first wānanga. Many commented on how they felt they had learned a lot during the process, and were appreciative of the work the project team had completed alongside them.

One suggestion from a participant to improve the framework was the addition of a "current condition" criteria (column). It was felt by the participant that this was an important component in decisions where substantial degradation had occurred. Given the largely historic nature of the data shared during mapping this was considered and important suggestion, and the resulting strategic restoration framework was amended to include a 'current condition' column. The addition of this column presented an information gap that will need to be filled with the whānau in the future, as this was outside of the scope of the current project.

3.5.2 Initial Output Priorities

As an example of how prioritisation might work and what the output might look like, the project team utilised the strategic restoration framework to provide an example 'first cut' attempt at prioritising each of the sites in the inventory. Not all sites were able to be prioritised, due to time constraints and the timing of mapping sessions with some whānau living out of the Kāwhia rohe. Priority was assigned to 43 of the overall puna and repo sites during this exercise. From this a total of 10 were identified as priority one, 25 as priority two and eight as priority three.

Although the draft priorities were presented at the second wānanga, the assignments made by the project team were not scrutinised/confirmed with the participants at that time and will need to be completed at a later date.

4 Discussion

The inventory of the wetlands known to our interviewees provides a wealth of spatially explicit knowledge regarding both repo and puna, and has made a large contribution to the growing understanding of the broader Maniapoto cultural landscape. This process has also highlighted not only the number of aquatic fisheries species dependent on these wetlands, but the loss and rarity of some species considered very important to Ngā Tai o Kāwhia whānau. It was noted by participants that the aim of restoration is to bring back many of these fisheries even though it is often not the fisheries themselves that will be the focus of restoration, encompassing notions of "when the ecosystem is restored, the fisheries will be able to return" (Participants, framework development wānanga, 2016).

The co-development of a strategic restoration framework allowed for the incorporation of varying criteria considered important by the Ngā Tai o Kāwhia whānau when prioritising restoration efforts in their rohe. This has been a very positive step towards documenting and organising mātauranga on fisheries, cultural significance, uses and associations of repo and puna in the Kāwhia rohe. It has also prepared both the Ngā Tai o Kāwhia RMC and MMTB to be more strategically poised to undergo restoration at priority sites when funding opportunities arise.

Below we outline some of the interesting findings from the project as well as some key learnings that the project team has taken from the overall process, the eBeam mapping methodology and how this process will be able to contribute to on-going work in the Kāwhia rohe, and more broadly throughout Maniapoto.

4.1 Key Learnings

The mātauranga collected and collated into a GIS database was not solely focussed on wetlands. This was likely an artefact of the methodology and approach used where the interviews did not seek to restrict participants to a pre-determined or strict format. The approach sought to elicit the mātauranga-ā-hapū grounded in their landscapes (Doherty 2012) by creating a space for a hapū to express their narratives (Fredericks, Adams et al. 2011). Some participants commented on the importance of projects like this one to capture knowledge that is fast declining with the passing of elders. Others noted the importance of capturing sites that may not be able to be restored (e.g., sites buried under buildings), to help maintain the stories, names and associations with these sites.

One of the key findings from this work is the numerous puna sites mapped with hapū participants. The location of puna in particular is often missed in council wetland mapping projects because of the GIS methodology used. Mapping for regional authorities (e.g., Waikato Regional Council) is often scale dependent, meaning small wetlands are difficult to delineate as they use satellite imagery at a set scale (usually around 1:10,000) to look for wetland vegetation and visible wetlands[7]. The national data set (at a scale of 1:50,000) shows there are only two puna sites in the Kāwhia region (Figure 4-1), while we mapped 27 different puna sites, some of which had multiple puna associated with them. As kaitiaki and mana whenua, hapū are often the most reliable source of knowledge regarding the location of puna, which is evidenced by 49% of the wetlands mapped in this project being puna. This is a significant contribution to the data set that the Ngā Tai o Kāwhia RMC and MMTB have access to.

[7] For example the Waikato Regional Council '2012 Biodiversity Vegetation' layer http://data.waikatoregion.govt.nz:8080/ords/f?p=140:12:6722005207659::NO::P12_METADATA_ID:2382.

The ability to map at a scale that enabled capturing puna with participants was facilitated using the eBeam participatory mapping methodology (see Section 4.1.2 for more details). However, while participants were happy to map the locations of these sites with the project team, they expressed their concern about how this type of information (i.e., especially locations of puna) may be misused, and cautioned the need for proper management and permissions prior to sharing the data.

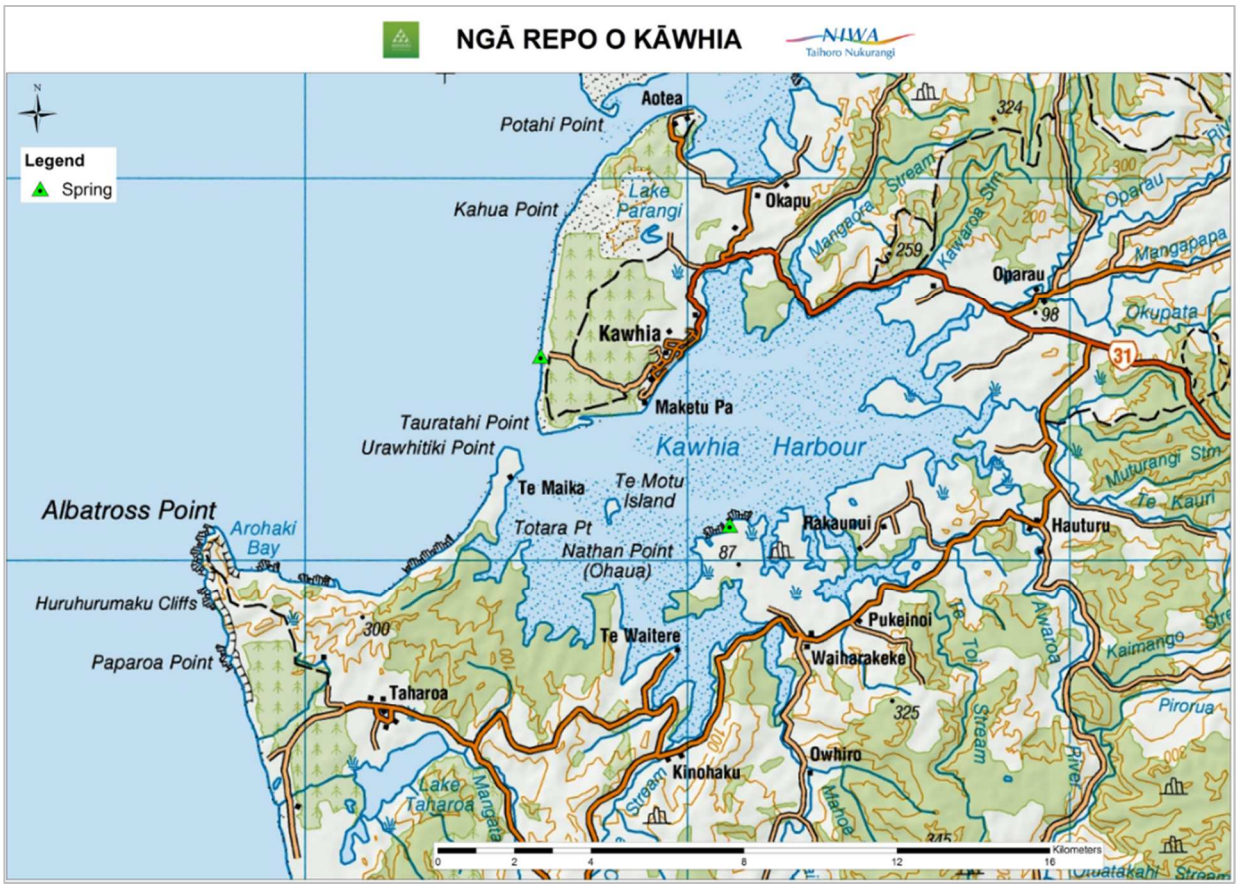


Figure 4-1: Map of the Kāwhia harbour demonstrating the location of two puna (springs) within the Kāwhia region (mapped at the scale of 1;250,000 within the national data set). Both the springs and Topo250 base layer were sourced from Land Information New Zealand Data Service.

An interesting dynamic occurred during the mapping wānanga which demonstrated a gendered difference between the participation and contributions made by those present. These were highlighted by the active and passive participation seen from the men and women during our mapping wānanga. The women would direct the men from the back of the room, but wouldn't take the control of the stylus (interactive mapping pen) and conduct mapping themselves. Interestingly when the women were interviewed individually they made many important contributions, and there was a notable difference in the types of knowledge shared. Women tended to talk more of the kai and mahi aspects of the puna and repo (e.g., rongoā, practices of harvest and weaving materials), while the men often focussed more on the wai and tāngata elements of the puna and repo (e.g., the battles and pā sites, where water was collected and how, spiritual associations). The consequence of the gendered difference of both participation and contributions made to the project by the male and female participants highlights some important methodological considerations, including the need to consciously design gender-balanced research (Pfeiffer and Butz 2005). This means specifically seeking

out and creating space for both the male and female voice during mapping interviews or group sessions.

Much of the focus from our framework development wānanga was on utility and uses of the sites (e.g., wai, kai and mahi), which may be somewhat misleading. Some may consider this to be the only way in which hapū value and associate with their repo and puna. While usage and physical associations are often the most tangible way in which whānau can express their values, these types of values are underpinned by concepts of mauri, whakapapa, manaakitanga and kaitiakitanga. While this prioritisation framework has a basis in the described uses and associations to these sites, it is inherently driven by the desire to restore a more holistic sense of wellbeing for hapū.

Interestingly while access was raised as a key determinant in the feasibility for restoration, demonstrated by scoring the highest in the tāngata category, many of the participants felt this was less of an issue for them. Comments included from participants included – “we are good negotiators, you just have to know how to talk to the right people” and “if you can’t beat them, get them to join you – invite them to be a member on your committee and they will begin to see why these places are important to us” (Participants, framework development wānanga, 2016). The general sentiment from this group may have stemmed from the fact that many were land holders or shareholders to large tracts of land held by whānau, which provided less of a barrier for access to sites in most cases.

4.1.1 The Strategic Restoration Framework

The strategic restoration framework was co-developed through an organic process with participants, and is a new approach to prioritising sites for restoration efforts. It explicitly sought to utilise Māori words (e.g., Āe, Kao, Māori species names) and not a numeric scoring approach within the framework to support a greater understanding of its criteria and how they are evaluated for its intended users. The framework was well received and supported by the participants, but could be improved moving forward. Neither the data populating the framework or the framework itself is intended to be static or unchangeable. As was suggested by one of our participants, an important factor in restoration is the current condition of a site, which was included in the final strategic restoration framework structure. Similarly, resulting outputs of priorities are not intended to remain static. Hapū can add sites and assess them for priority, and/or reassess priority of sites as uncertainties (e.g., access) are resolved or restoration is achieved.

While MCDA (e.g., Ausseil, Dymond et al. 2007) and spatially explicit ecological model approaches (e.g., Moilanen, Leathwick et al. 2011) often utilise multiple factors to determine priorities, decisions are made using complex aggregation algorithms to rank sites (Kiker, Bridges et al. 2005; Proctor and Drechsler 2006) and are removed from people. This framework differs in that it requires the user/s to deliberate and compare not only all criteria within sites, but across all sites considered, to assign priority for themselves. This more subjective approach to prioritisation seems appropriate given that only hapū can determine their priorities. Additionally, prioritisation is often based on current condition of sites, and easily quantifiable ecological and/or economic data (Kiker, Bridges et al. 2005; Ausseil, Dymond et al. 2007; Moilanen, Leathwick et al. 2011). In contrast the framework produced in this project utilises mātauranga which is often reflective of historical condition, and in turn the aspirational state of sites in the prioritisation process. While mātauranga, can be both qualitative and quantitative, it often references historical condition and encompasses a much broader and interconnected set of knowledge (Doherty 2012). The context provided by mātauranga, enables understanding of the past condition, contemporary concerns and future aspiration of hapū (Tipa

2013), which in turn offers insight into how these aspects guide hapū prioritisation of restoration efforts across their ancestral landscape.

The framework itself pulls together the emergent themes from both the interviews and wānanga. One of the key values identified was the provision of fresh water for human use (drinking water) and to support the livelihood of whānau through watering of livestock. The importance of water to maintain farming practices was primarily emphasised by two participants currently farming their own lands, but also to a lesser extent by others who reflected that growing up, they often depended on healthy livestock for consumption and economic livelihood. This was captured in the framework where water used for both human and animal consumption were the two 'mea matua' or main uses in the Wai category.

Overall the strategic restoration framework was seen as a way to structure the conversation, and justify decisions against the collective values of these sites to support more transparent decision-making.

4.1.2 Data Collection

The first attempt to explore the use of participatory eBeam mapping at the wānanga provided some important learnings regarding the process. There are many advantages to the use of the more technologically advanced eBeam mapping method. The major advantages being the interactivity of this digital tool – allowing the ability to zoom in and out, to enable or disable different layers of data (e.g., Topographic maps, satellite imagery, marae locations, council wetland probability layers) – and the capturing of much more accurate shapes on the landscape. The process of working directly in the mapping software (e.g., ArcGIS) allowed our participants to orient themselves at a broad scale and then direct the GIS facilitator to zoom closer in to a scale where, for example, individual puna could be mapped, marker trees seen and cave entrances distinguished on satellite imagery. The accuracy of the shapes captured is demonstrated in Figure 4-2 where the same participant mapped both using eBeam mapping and paper-based mapping. This image shows the accuracy and detail able to be captured with the eBeam tool.

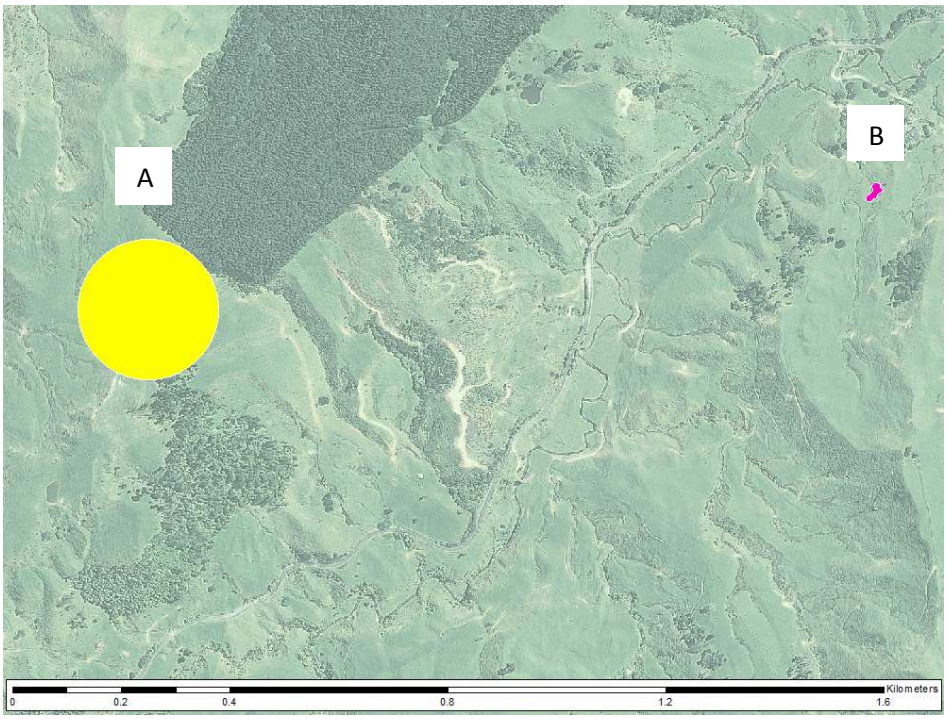


Figure 4-2: Example of the difference between mapping the same *type* of site with paper-based maps (A) printed at a certain scale (1:20,000) and with the eBeam (B). Both sites were mapped by the same participant demonstrating differences in detail of shape and size achieved using eBeam. Note: site A was mapped on a topographic map and site B was mapped on a satellite image.

Some of the other key advantages of the eBeam process include the ability to efficiently capture data directly into the GIS database during the mapping process, reducing the time required to transcribe and digitise from paper maps into a mapping software. The interoperability of GIS-based map layers also provides the ability to combine this mapping with other GIS systems and map-based projects within the MMTB (e.g., the MMTB Taonga Register project).

Initially many of the participants were apprehensive with the use of the eBeam technology and having to orientate themselves on the digital maps, but as the interview progressed, the participants became more comfortable. The process facilitator often had to guide the mapping, and in all but a few cases participants directed the drawing of shapes on their behalf, remaining very active in ensuring accuracy. When mapping concluded, all participants generally expressed that this was a good way to capture knowledge, and seemed comfortable with what they had contributed.

One of the key limitations of the eBeam technology is that one person can 'hold the pen' at a time (i.e., there is only one stylus pen that can draw the shapes on the map), therefore in the group session, some participants became restless. The active participant is able to share the mapping experience with passive participants (as seen throughout our process), however, our experience suggested that perhaps individual (or smaller paired focus groups) interview sessions were more successful. Additionally, individual mapping sessions reduced the time burden on each of the interviewees and created the space for our female interviewees to share and contribute as active participants in a way that the group mapping sessions did not.

4.2 Potential Applications

The National Objectives Framework (MfE 2104) states 'protecting the significant values of wetlands' as a key component of water quality objective (A2.b). Our work suggests that for Ngā Tai o Kāwhia whānau, key values for these ecosystems include water use (human and stock), various mahinga kai species (e.g., tuna, whitebait, pupu, ngorongoro, koeke/kueke and flounder), a source of materials for raranga (e.g., harakeke, raupō and paru), a store house for taonga, a location for mahinga kai practices (e.g., pā tuna, rua tuna) as well as a multitude of associations (e.g., wāhi tapu, pā sites).

This project has been a positive learning process for not only the project team in piloting and implementing a new methodology and framework, but also for the participants. Many of the participants expressed gratitude for being involved in the project, commenting that they had learned a lot in the process. The project has also contributed achieving some of the objectives set out in the Maniapoto Environmental Management Plan (Maniapoto Māori Trust Board 2016), Section 15.3, specifically to:

- Raise awareness and understanding within communities of Maniapoto values associated with wetlands (15.3.1.1 (b)).
- Recognise, preserve and protect all wetland and riparian areas that provide important cultural and environmental benefits (15.3.2.1 (a)).
- Support initiatives to restore wetlands, including: i) maintaining a wetland inventory, ii) identifying and mapping historic and existing wetlands, and iii) promoting collaborative restoration projects (15.3.2.1 (b)).

This pilot project has provided the collaborative project team with many key learnings about the process and methodology employed, as well as built some key capacity to conduct this type of work with hapū members within the Whanake Taiao team at MMTB. Recently the project team received further funding from the MBIE Vision Mātauranga Capability Fund to continue this work with other RMCs in the Maniapoto rohe to both inventory their wetlands, and further refine the framework for prioritisation to suite their unique wetland ecosystems.

4.3 Next Steps

The strategic restoration framework and repo inventory provides a great starting point for both the Ngā Tai o Kāwhia RMC and the MMTB Whanake Taiao team to strategically move forward with the practical application of the tools developed in the next phase. Some of the next steps are identified below.

- MMTB and NIWA present key findings of Ngā Repo o Kāwhia to the Ngā Tai o Kāwhia RMC (included in the final stages of this project):
    - Provide time to demonstrate and support the RMC to use the strategic restoration framework and enable them to assign priorities to their sites.
    - Discuss the possibilities to fill in some of the information gaps, including seeking additional information on some sites for example names, accessibility and the current condition of priority sites.

- MMTB and Ngā Tai o Kāwhia RMC collaboratively seek funding to restore a priority one wetland identified using the strategic restoration framework, through Te Wai Māori Trust or other funding mechanisms.

- MMTB and NIWA design a user-friendly poster as a communication tool for the Ngā Tai o Kāwhia RMC (as an alternative to this technical report), articulating the purpose and outcomes of Ngā Repo o Kāwhia project. This will be printed and distributed to the RMC.

- MMTB and Ngā Tai o Kāwhia RMC work towards integrating the spatial wetland inventory with the Waikato Regional Council's wetland probability layer to identify opportunities for collective restoration efforts on priority 1 repo. This approach could provide opportunities to:

    - leverage existing co-governance and co-management instruments and demonstrate the benefits of MMTB's Joint Management Agreement with Local Authorities, and Accords with Crown Agencies (e.g., Department of Conservation, Ministry for the Environment), and

    - feed into local, regional and national policy and planning processes.

- MMTB continue the application of the eBeam technology within current and ongoing participatory processes to engage with iwi members. This has potential applications in projects such as the Taonga Register project, however, this approach also has possible utility in other aspects of MMTB work (e.g., internal planning processes).

5 Acknowledgements

We would like to acknowledge Ngā Tai o Kāwhia RMC and hapū participants for the opportunity to work alongside them throughout this project. It has been an honour and privilege and we have learnt from you equally as much as you have learnt from us. We thank you for your commitment and perseverance to see this kaupapa through to the end, and we acknowledge our tūpuna and loved ones that have passed during the implementation of this project.

Haere, e ngā mate, haere atu rā, moe mai rā.

We sincerely hope that the repo inventory and strategic framework will be a useful tool for directing future restoration efforts for whānau and the wider community in the Kāwhia rohe.

As the project team, we also acknowledge Te Wai Māori Trust, MMTB, and NIWA for funding and supporting this project. We also want to thank the other staff involved from both MMTB and NIWA for their support and technical guidance throughout the project. Thanks to MMTB staff Kura, Jo and Titahi for on the ground support and helping with logistics throughout the interviews and wānanga process. Thanks also to NIWA staff Kate Davies for support with understanding and developing social science methodologies, Sanjay Wadhwa for mapping advice and Aarti Wadhwa for graphics assistance. Thanks to Tipene Wilson and Erica Williams for their guidance and critical thinking in the final review stages of the report.

Mā tāu rourou, mā taku rourou, ka ora ai a Maniapoto.
Tēnā koutou, tēnā koutou, tēnā tātou katoa.

6 Glossary of abbreviations and terms

GIS	Geographic Information Systems.
Hapū	Kinship group, clan, tribe, subtribe – section of a large kinship group and the primary political unit in traditional Māori society.
Iwi	Extended kinship group, tribe – often refers to a large group of people descended from a common ancestor and associated with a distinct territory.
Kaitiaki	The people who carry out kaitiakitanga.
Kaitiakitanga	The exercise of customary custodianship, in a manner that incorporates spiritual matters, by those who hold mana whenua status for a particular area or resource.
Kaumātua	Respected elder.
Kaupapa Māori	Māori ideology or approach to research – a philosophical doctrine, incorporating the knowledge, skills, attitudes and values of Māori society.
Kawa	Ceremonial customs and rituals related to formal activities.
Mahinga kai	Referring to the species that have traditionally been used as food, tools, medicine, or other resources, including the act of harvesting and use of those resources and the places they are gathered.
Mana	Prestige, authority, influence, status.
Mana whenua	Those with the authority and territorial power derived from their association, possession and occupation of their lands.
Mana motuhake	The inalienable authority (mana) through self-determination and control over one's own destiny.
Mātauranga Māori	Māori knowledge – the body of knowledge, including knowledge originating from Māori ancestors, includes the Māori world view and perspectives, Māori creativity and cultural practices; inclusive of past, present and future knowledge.
Mātauranga-a-iwi/hapū	In this context, the iwi or hapū based knowledge held specifically by Maniapoto iwi and hapū, regarding their cultural landscapes, uses, resources and values.
MBIE	Ministry for Business, Innovation and Employment.
MMTB	Maniapoto Māori Trust Board.
NIWA	National Institute of Water and Atmospheric Research.

NOAA	National Ocean and Atmospheric Administration (USA).
Puna	Spring or seepage.
Repo	Swampy area, swamp, bog or marsh.
RMC	Regional Management Committee.
Rongoā	Traditional healing practices and remedies.
Rohe	Territorial/tribal area of the iwi/hapū.
Tāngata whenua	The local people, indigenous people – people born of the land those that have traditional custodial relationships.
Taonga	Anything that is prized or to be of value to hapū, could include (but is not limited to) objects, places, resources, phenomenon, stories, ideas and techniques.
Tikanga	The customary system of values and practices that have developed over time and are deeply embedded in the social context.
Wānanga	The gathering of people to discuss, deliberate, consider knowledge sharing and learning, usually in a marae setting and hosted by the tāngata whenua of a marae.
Whakairo	To carve or ornament with pattern, traditional carvings.
Whanake Taiao	The environmental arm of the Maniapoto Māori Trust Board (MMTB).
Whānau	An extended family, family group, or a familiar term of address to a number of people.
WRC	Waikato Regional Council.

7 References

Ausseil, A.-G., Dymond, J.R., Shepherd, J.D. (2007) Rapid mapping and prioritisation of wetland sites in the Manawatu–Wanganui Region, New Zealand. *Environmental Management*, 39(3): 316-325.

Ausseil, A.-G., Gerbeaux, P., Chadderton, W.L., Stephens, T., Brown, D., Leathwick, J. (2008) Wetland ecosystems of national importance for biodiversity: Criteria, methods and candidate list of nationally important inland wetlands. *Landcare Research Contract Report,* LC0708/158.

Belton, V., Stewart, T.J. (2002) *Multiple criteria decision analysis : an integrated approach*. Kluwer Academic Publishers, Boston.

Colfer, C.J.P. (1999) *The grab bag: supplementary methods for assessing human well-being*. CIFOR: Volume 6, Center for International Forestry Research, Indonesia.

Doherty, W. (2012) Ranga Framework - He Raranga Kaupapa. . In: T. Black, D. Bean, W. Collings & W. Nuku (Eds). *Conversations on mātauranga Māori*. New Zealand Qualifications Authority, Wellington: 15 - 36. http://www.nzqa.govt.nz/assets/Maori/ConversationsMMv6AW-web.pdf

Duinker, P.N., Greig, L.A. (2007) Scenario analysis in environmental impact assessment: Improving explorations of the future. *Environmental Impact Assessment Review*, 27(3): 206-219.

Fredericks, B.L., Adams, K., Finlay, S.M., Fletcher, G., Andy, S., Briggs, L., Briggs, L., Hall, R. (2011) Engaging the practice of yarning in Action Research. *Action Learning and Action Research Journal*, 17(2): 7-19.

Glaser, B., Strauss, A. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine Publishing Company, Chicago.

Johnson, P., Gerbeaux, P. (2004) *Wetland Types in New Zealand*. Department of Conservation, Te Papa Atawhai, Wellington, New Zealand: 185.

Kiker, G.A., Bridges, T.S., Varghese, A., Seager, T.P., Linkov, I. (2005) Application of multicriteria decision analysis in environmental decision making. *Integrated environmental assessment and management*, 1(2): 95-108.

Levine, A.S., Feinholz, C.L. (2015) Participatory GIS to inform coral reef ecosystem management: Mapping human coastal and ocean uses in Hawaii. *Applied Geography*, 59: 60-69.

Lynam, T., de Jong, W., Sheil, D., Kusumanto, T., Evans, K. (2007) A review of tools for incorporating community knowledge, preferences, and values into decision making in natural resources management. *Ecology and Society*, 12(1): 5. http://www.ecologyandsociety.org/vol12/iss1/art5/

Maniapoto Māori Trust Board (2015a) He Mahere Ika - Maniapoto Upper Waipā Fisheries Plan.

Maniapoto Māori Trust Board (2015b) Te Taiao, Accessed online at: http://www.maniapoto.iwi.nz/priorities/te-taiao/, April 2017.

Maniapoto Māori Trust Board (2016) Ko tā Maniapoto Mahere Taiao - Maniapoto Environmental Management Plan.

Mendoza, G.A., Martins, H. (2006) Multi-criteria decision analysis in natural resource management: a critical review of methods and new modelling paradigms. *Forest ecology and management*, 230(1): 1-22.

Moilanen, A., Leathwick, J.R., Quinn, J.M. (2011) Spatial prioritization of conservation management. *Conservation Letters*, 4(5): 383-393.

NOAA (2014) Guidebook to Participatory Mapping of Ocean Uses. *Social Science Tools for Coastal Programs*: 31.

NOAA (2015) Stakeholder Engagement Strategies for Participatory Mapping. *Social Science Tools for Coastal Programs*: 28.

Peterson, G.D., Cumming, G.S., Carpenter, S.R. (2003) Scenario Planning: a Tool for Conservation in an Uncertain World. *Conservation Biology*, 17(2): 358–366. http://dx.doi.org/10.1046/j.1523-1739.2003.01491.x

Pfeiffer, J.M., Butz, R.J. (2005) Assessing cultural and ecological variation in ethnobiological research: the importance of gender. *Journal of Ethnobiology*, 25(2): 240-278.

Proctor, W., Drechsler, M. (2006) Deliberative multicriteria evaluation. *Environment and Planning C: Government and Policy*, 24(2): 169-190.

Schoemaker, P.J. (1995) Scenario planning: a tool for strategic thinking. *Sloan Management Review*, 36(2): 25-41.

Schwartz, P. (1996) *The art of the long view: paths to strategic insight for yourself and your company*. Doubleday, New York: 272.

Sheil, D., Liswanti, N. (2006) Scoring the Importance of Tropical Forest Landscapes with Local People: Patterns and Insights. *Environmental Management*, 38(1): 126–136. http://dx.doi.org/10.1007/s00267-005-0092-7

Stewart, T.J., French, S., Rios, J. (2013) Integrating multicriteria decision analysis and scenario planning—review and extension. *Omega-International Journal of Management Science*, 41(4): 679-688.

Tanner, C.C., Howard-Williams, C., Tomer, M.D., Lowrance, R. (2013) Bringing together science and policy to protect and enhance wetland ecosystem services in agricultural landscapes. *Ecological Engineering*, 56: 1-4.

Taura, Y., Schravendjik-Goodman, C.V., Clarkson, B. (2017) *Te Reo o Te Repo*. *Connections, understandings and learnings for the restoration of our wetlands*. Manaaki Wheuna - Landcare Research and Waikato Raupatu River Trust, Hamilton, New Zealand: 209.

Tipa, G. (2013) Bringing the past into our future—using historic data to inform contemporary freshwater management. *Kōtuitui: New Zealand Journal of Social Sciences Online*, 8(1-2): 40-63. 10.1080/1177083X.2013.837080

Tipa, G., Williams, E., Herangi, N., Dalton, W., Skipper, A., Iti, W. (2014) Maniapoto priorities for the restoration of the Waipā River catchment. *NIWA Client Report*, WEL2015-3.

8 Appendix A: How to use the Framework

The strategic restoration framework developed throughout this project was designed to help frame the knowledge shared by participants so that the different important criteria/values of each repo and puna are able to be considered together, and are also able to be compared across sites within the framework to guide hapū in establishing their relative priorities. This framework does not provide an automated recommendation for priorities, instead the user (e.g., Iwi authority, RMC or hapū) is able to assign priorities once they have considered all sites within the matrix. Below is a guide as to steps involved in the process leading up to using the framework (Figure 8-1), populating of data into matrix and an example of the assignment of priorities.

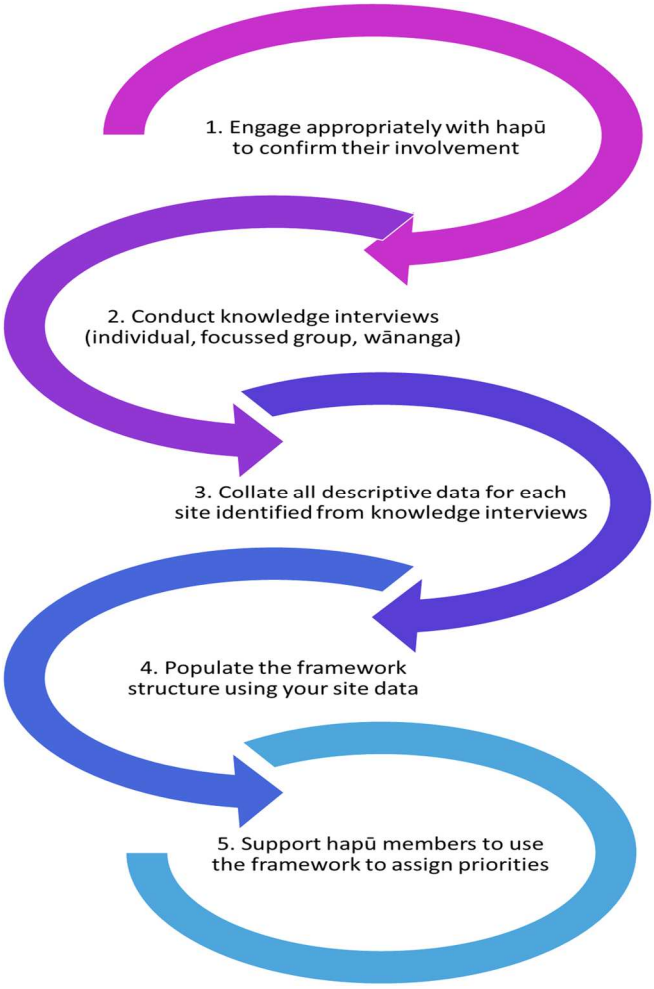


Figure 8-1: Key steps in the process for hapū assigning strategic restoration priorities.

The key steps in the process are outlined as follows with brief descriptions of each step.

1. **Engagement** – this step involves engaging with hapū participants. Within this project we followed the process and protocol led by the MMTB Whanake Taiao team for engaging the hapū in Kāwhia. This included initial introductory hui at the RMC meetings, engaging a local champion and providing a written summary of the project to participants prior to interviewing. Participants were able to decide if they would like to be involved and ask any questions or raise any other concerns prior to participating.

2. **Knowledge interviews** – this includes the gathering of the mātauranga that will populate the framework. (Note: In the case of this project, we also co-developed the framework with hapū participants based on the contributions of our participants during the knowledge interviews). This can be done using multiple methods (e.g., participatory mapping using eBeam and/or paper mapping), and at multiple scales (e.g., individual or group mapping sessions). Importantly, with this process, using maps highlights the spatial nature of the information being collected (i.e., where these sites are located).

3. **Collating data** – this step involves collating all of the data collected into a standardised GIS database. This gathers together all interviewees contributions into an inventory of sites which will provide the basis of data used to populate the framework. The key components required when collating all sites are a unique ID for each site, the site name (if recorded by participant), and the description of the values, uses and associations for the site. Other information including, legal and physical accessibility, aspirations for future state or current state should also be included in the description of the site. The collation of this information into the matrix (e.g., within a Microsoft Excel spreadsheet) allows you to then populate the framework.

4. **Populating the framework** – this step involves filling out each column of the matrix.

   The following outlines each of the columns of the matrix and describes how to populate them for each site:

   a. *Overall ID* – a unique identifier for each site (from GIS database).

   b. *Ingoa* – the name of the site if it was known by the participant. Some participants may not have known the names, but that does not preclude there being a name for that site (from GIS database).

   c. *Description* – the key information shared by each participant (or multiple participants) regarding a particular repo or puna (from GIS database). This would include any uses, values, and or associations to a site. It may also include any contemporary context or aspirations for each site as dictated by participants.

   d. *Puna/Repo/Other* – this is to indicate if it is either a puna, repo or other site (from GIS database). Often during mapping sessions, sites are noted by participants that may not be a puna or repo, but make up a component of the ancestral landscape of that hapū. This methodology encourages capturing the information spatially and within the database which is a repository for mātauranga to be utilised by the hapū. Therefore, each site is able to be assigned as a repo, puna or other.

   The remaining columns are filled in by the user by utilising the information shared in the preceding columns.

   For the next three columns a distinction is made between the dominant and less dominant uses of the sites within each of the key use categories (wai, kai and mahi). The specific uses that were discussed with Ngā Tai o Kāwhia participants and their distinction within each of the criteria is demonstrated in Figure 8-2.

Figure 8-2: Distinctions made between the dominant and other components of the Wai, Kai and Mahi values within the framework. This is not a static list and can be added to or amended as the hapū see fit, and as more information comes to light from other interviewees.

a. *Wai* – for this criteria there are two components, first noting whether this site was used for any water related uses (Āe/Kao) and second, if yes, then you can either note it was a 'mea mātua' or a 'mea atu' (Āe/Kao) or if preferred, it could be noted the type of water associated use (e.g., 'Wai (drinking)' in the mea mātua column).

b. *Kai* – for this criteria, as with Wai, there are two components, first noting if the site was used for any food resource gathering (Āe/Kao), and second noting the specific resource gathered in either the mea mātua or mea atu column. Noting the species within this column provides a more specific look at the site and enables hapū members to include a 'rarity factor' during their prioritisation (i.e., decisions being made on priority may be influenced by the presence of a rare and important species at a site).

c. *Mahi* – for this criteria, as with both above, there are two components, first noting if the site was used for gathering of materials used in cultural practices (Āe/Kao) and second noting the specific resources or activities practices in the mea mātua or mea atu columns.

d. *Wāhi* – this criteria specifically notes whether this site was associated with other places or features of the hapū cultural landscape. These include historical papakāinga/wāhi noho, pā sites, sites where deaths have occurred, nearby caves (e.g., burial caves) and pā tuna.

e. *Kōrero* – this criteria highlights where there are associated stories, historic but no longer active uses, and factors relating to the iwi identity and association to sites. Some examples include historic battlegrounds, sites for taonga preservation and storage, sites of historic hapū stories (e.g., arrival of ancestral canoe and naming sites)

f. *Whenua* – within the matrix this specifically notes if hapū have the physical ability to access sites (Āe/Aua/Kao) (e.g., distance to nearest access point, or sites blocked by dense gorse bush)

g. *Mana* – this criteria notes specifically if hapū have legal access to the site (Āe/Aua/Kao). Within this column, hapū could also note some details (e.g., Land Owner name/details)

h. *Mea motuhake* – this criteria was added to ensure that sites that have a special factors associated with them (e.g., the best site for collecting paru in the rohe or the only site that has a specific taonga species like ngorongoro) can be specifically noted for hapū decision makers to consider.

The following two columns need to be completed in the next step.

a. *Priority* – this column is where the hapū decision makers note the priority given to a site.

b. *Why?* – this column allows space for hapū decision makers to provide a brief reasoning as to why a site was assigned the priority it was given if they desire.

5. **Supporting hapū to prioritise their sites** – while the mapping and population of the framework can be done by anyone the hapū deems appropriate to work with their mātauranga, the final assignment of priorities to sites will need to be undertaken by the hapū members designated the mandate to make those decisions. Below in Table 8-1 two fictitious examples are provided to demonstrate what the table will look like when it has been populated and the priorities that might be assigned to these sites. As mentioned this matrix is a framework that supports the structuring of mātauranga to provide a consistent way for assessing all sites across the key criteria, but also among all the sites populating the framework.

The following two examples show how hapū might reason through their decisions to assign each site to a priority tier.

Example: ‘Site 1’ is a puna site that was used to collect drinking water from and where a patu was found. Given it was used for drinking water (one of the most important values), coupled with the associated kōrero as a place where a taonga was stored, makes this a high priority site for restoration. However, due to not currently having legal access, the priority assigned to this site could be a two. It is important to note that the framework is not intended to be static, if legal access was gained (e.g., through building relationships with the land owner) then the hapū could re-assign it to be a priority one.

Example: ‘Site 2’ is a repo site that was used primarily for harvesting of resources both for kai and mahi. With two of the resources (whitebait and harakeke) falling in to their respective ‘mea mātua’ categories, this site is a high priority over multiple values. Although there are no associated kōrero or wāhi attached to this particular site, access both physically and legally has been designated as possible. Given its importance for harvesting and cultural practice, and its accessibility, this site might be given a priority one.

Table 8-1: Decision support matrix developed as a framework to structure mātauranga and help guide the assignment of restoration priorities. The matrix is populated with two example sites and their assigned priority based on the mātauranga shared.

Overall ID	Ingoa	Description	Repo/Puna/Other	WAI	MEA MĀTUA	MEA ATU	KAI	MEA MĀTUA	MEA ATU	MAHI/ USES	MEA MĀTUA	MEA ATU	WĀHI	KŌRERO	WHENUA	MANA	MEA MOTUHAKE	PRIORITY?	WHY?
1	Te Puna	Puna used for drinking water, also site where patu was found.	Puna	Āe	Āe		Kao			Kao			Kao	Āe	Āe	Kao		**2**	Important for water, taonga preservation, legal access required first.
2	Te Repo	Repo for harvesting whitebait, harakeke & tī mouka fibres used in weaving.	Repo	Kao			Āe	Whitebait		Āe	Harakeke	Tīmouka	Kao	Kao	Āe	Āe		**1**	Important kai and mahi site, accessibility is good to begin restoration activities.