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MĀTAURANGA MĀORI KNOWLEDGE NETWORKS

This report was commissioned by the Technical Leaders Group for
the Healthy Rivers Wai Ora Project

The Technical Leaders Group approves the release of this report to Project Partners and the Collaborative Stakeholder Group for the Healthy Rivers Wai Ora Project.

Signed by:

Date: 23 November 2015

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MĀTAURANGA MĀORI KNOWLEDGE NETWORKS

Report on factors affecting food gathering, swimming and special characteristics on the Waikato and Waipa Rivers and their tributaries from a Māori perspective

Prepared by Te Onewa Consultants

July 2015

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SUMMARY

This report has been prepared for the Healthy Rivers – Waiora whakapaipai project. This report articulates relationships and inter-dependencies of three subject areas; swimming in rivers, the taking of mahinga kai species and special characteristics of rivers from a River Iwi perspective. Engagement with River Iwi representatives / experts and kaumatua was achieved through a series of hui and a mātauranga Māori workshop held at Karapiro on the 23 March 2015. A literature review was also conducted and is attached to this report.

One of the key outcomes sought in this report was to contextualise the four contaminants, nitrogen, phosphorus, sediment and pathogens. By doing so it facilitated a broad discussion with iwi that considered their holistic view of the environment, but also indicated what the role the four contaminants might play in enhancing or reducing River Iwi values associated with swimming, mahinga kai and other special characteristics of rivers.

To this end sediment, or its reduction in the water column was a consistent and important factor identified by literature and engagement with River Iwi. This report identifies sediment and other contributing contaminants to water discolouration as a significant contributor to reducing a myriad of River Iwi values including swimming, mahinga kai and special relationships with waterbodies. This does not dismiss the impact of nitrogen, phosphorus and pathogens on river quality particularly with regard to flow on effects such as algal blooms and human health risks.

As already mentioned this report identified a range of factors affecting river quality from a mātauranga Māori perspective. This list is long and broad, however there were a number of factors that stood out, these being:

- The traditions, history; knowledge and experiences of River Iwi
- The ability to physically access rivers, streams and lakes
- The abundance of kai,
- Physical barriers to fish migration
- The quality of the habitat to sustain life
- The presence of pest plants and fish
- The presence of '*te paru i te wai*' (dirty water)
- The use of water for economic, social and cultural well-being
- The flow of water
- The presence of, and use of wai tapu
- The knowledge and protection of wāhi tapu and wāhi tupuna
- The safety of places to swim, and
- Modification of river course and banks.

The various frameworks and models identified in the literature review and expressed at the mātauranga Māori workshop suggest there are two distinct and interrelated perspectives of River Iwi. The first is the river, stream or lake is an entity in itself that includes the land, the water, the rocks, the air, the living plants and animals, and the spiritual dimension of place. The second relates specifically to the qualities of the water. The difference between these two approaches is quite different. From a Māori perspective one, cannot be without the other.

Most River Iwi have prepared or are in the process of completing Iwi management plans that set out their values, principles, and views with regard to a range of environmental matters

including waterbodies. These plans should be read in conjunction with this report. This report identified several areas where there was a lack of information or relevant data. This included:

- Information regarding a range of lakes;
- the location and condition of popular swimming places,
- the location and condition of wai tapu and wāhi tapu, and
- specific measures and limits for mātauranga Māori or cultural attributes/indicators.

Further work in these areas will be necessary to measure and monitor progress in cleaning up the rivers, not only as part of the Healthy Rivers project but on-going efforts to implement the Vision and Strategy.

INTRODUCTION

Purpose

The purpose of this report is to articulate the relationships and inter-dependencies of three subject areas; swimming in rivers, the taking of mahinga kai species and special characteristics of rivers from a River Iwi perspective.

In particular, the report summarises the results of engagement with River Iwi representatives / experts and literature review that:

- Articulates the relationships and inter-dependencies of three subject areas; swimming in rivers, the taking of mahinga kai species and special characteristics of rivers from an iwi perspective.
- Identifies factors that influence the key values related to swimming, fishing and river characteristics from a Māori perspective.
- Explores the relationships between influencing factors using a variety of tools including knowledge networks.

Author

This report has been prepared by Antoine Coffin (Te Onewa Consultants) with support from Jacqueline Henry (Waikato Regional Council) and John Quinn (NIWA). Antoine Coffin has seventeen years' experience in Māori resource management, heritage planning, community engagement and facilitation.

Clients

This report has been prepared for the Technical Leaders Group to assist in informing the Collaborative Stakeholder Group in their discussions and deliberations regarding freshwater objectives, limits and policies for a proposed Plan Change to the Waikato Regional Plan.

Scope

This report draws on information collated from a literature review (Appendix 2), hui or workshops with individual iwi and a River Iwi Mātauranga Māori workshop held on 23 March 2015.

The literature review of Waikato, Raukawa, Te Arawa, Ngāti Maniapoto, Tuwharetoa, iwi management plans and/or fisheries plans, project reports and inputs to the comprehensive Waikato River Independent Scoping Study (2010) provided a wealth of information regarding taonga species, kai species, unwanted or pest fish and identified a number of factors affecting swimming, mahinga kai and special characteristics of rivers including water quality. The iwi management plans of iwi have received considerable resources and input of iwi members to articulate values, concerns and objectives of iwi, with particular focus on water.

Hui were held with iwi representatives to confirm their participation in workshops and familiarising them with the types of questions that would be asked of participants. All River Iwi participated in hui, and one workshop was held with Raukawa kaumatua and experts on 11 March 2015 at Tokoroa.

A collective workshop of River Iwi experts, kaumatua and representatives was held on 23 March 2015 at Karapiro. It was originally planned to have 2-3 workshops and site visits however due to availability, one workshop was held. At the workshop participants were asked

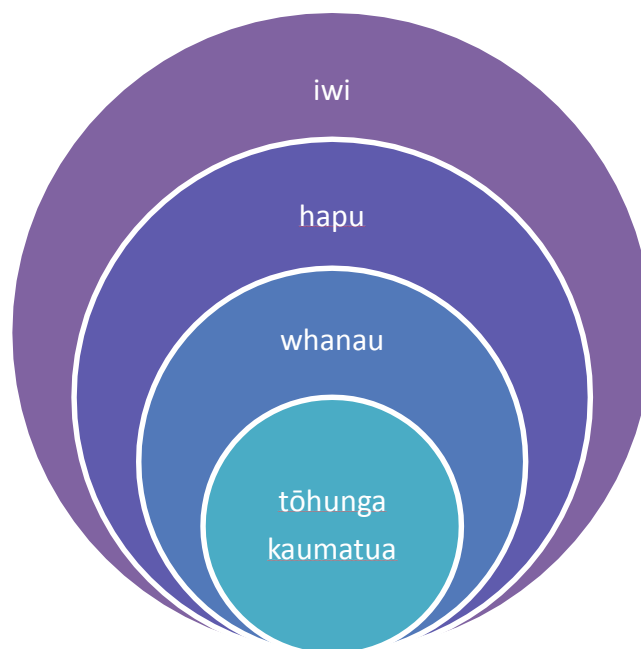
to describe kaukau (swimming) and Mahinga kai/hauanga kai from their perspective. They were also asked to identify factors that affect kaukau and mahinga kai/hauanga kai. As part of the workshop participants were able to have broad and deep discussion regarding iwi views of tikanga, kawa, natural and metaphysical phenomenon and special characteristics of rivers. The workshop provided a wealth of information, including sensitive information, some of which had not been shared by iwi experts with their own iwi. As such there was some concern regarding releasing the workshop notes to the public. In the report reference is made to the workshop, and summaries and general intent are described to protect the 'confidential information' shared at the workshop.

A presentation hui was held on 19th August to present the main findings of the report. Further comments from River Iwi were received and incorporated into the report.

The report format is set out similar to the objectives of the project, with some context provided for mātauranga Māori and the background to the project.

Mātauranga Māori

Mātauranga Māori is a term that describes the body of knowledge originating from Māori ancestors, including the Māori world view and perspectives, Māori creativity and cultural practices.¹



Mātauranga Māori embraces individual, local and collective knowledge, Māori values, cultural expressions, perspectives, observations, being traditional, historical and contemporary. Bodies of knowledge can be shared, held collectively by whanau, hapū and iwi, however, there are bodies of knowledge that are held specifically by tohunga (tribal experts) and kaumatua (elders). Each body of knowledge comes with a certain amount of tapu (restriction, purpose, association) and these tapu must be respected or a hara (calamity) may befall the person or

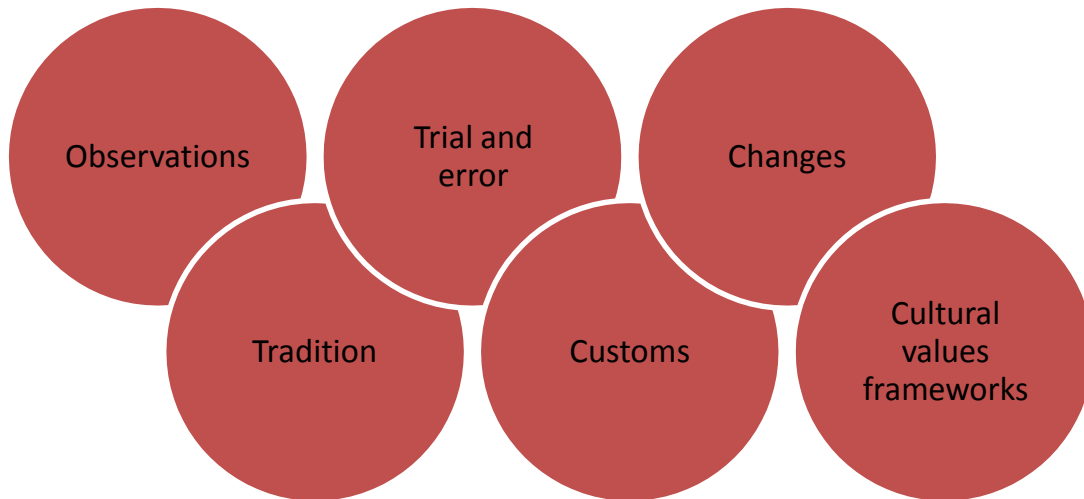
¹ Te Aka Maori-English. 2015

group. In general terms, the more people who held certain knowledge the less tapu it was. In traditional Māori society knowledge was a source of great prestige, spiritual power and influence.

Bodies of knowledge are in traditional Māori society derived from the Atua, honed through observation, trial and error, and passed from one generation to another through modes of waiata, karakia, whakairo, and korero.

*Nā te kune te pupuke
Nā te pupuke te hihiri
Nā te hihiri te mahara
Nā te mahara te hinengaro
Nā te hinengaro te manakō
Ka hua te wānanga*

*From the conception the increase
From the increase the thought
From the thought the remembrance
From the remembrance the consciousness
From the consciousness the desire.
Knowledge became fruitful*



Sources of Mātauranga Māori (Coffin:2014)

An important aspect of mātauranga Māori is that it is dynamic, in both a temporal and spatial sense. Thus from one iwi to another, even one hapu to another, mātauranga can change its values and concepts. So, for the various river iwi, mātauranga in relation to characteristics of the river, might mean slightly or quite different things. The breadth of interpretation and application of mātauranga is one of the challenges of application to policy development. Some iwi have communicated mātauranga ā iwi in iwi management plans and other written

documents and have consciously moderated the content to ensure the sanctity of the information is protected and respected. Iwi management plans should be read in conjunction with this report to understand the individual Iwi views.

BACKGROUND

The Vision and Strategy for the Waikato River sets out an overall vision to restore and enhance the river. Within the series of objectives for the vision and strategy is, objective (k): The restoration of water quality within the Waikato River so that it is safe for people to swim in and take food from over its entire length.

The five river iwi, Tuwharetoa, Ngāti Maniapoto, Te Arawa River Iwi, Raukawa and Waikato and Waikato Regional Council have established a Collaborative Stakeholder Group (CSG) to provide representative community based recommendations to decision-makers on issues and potential policy options to restore and protect the Waikato and Waipa water bodies (rivers, streams and lakes). A Technical Leaders Group (TLG) supported by a Technical Support Group (TSG), comprising eminent scientists, have been formed to support the CSG. The technical leaders group, supported by the TSG, is responsible for responding to the information needs of the CSG. Among other things, this involves developing work briefs to address specific information needs identified by the CSG. Funding for any technical work is provided by Waikato Regional Council.

The Collaborative Stakeholder Group have produced a focus statement for the programme.

“To come up with limits, timelines and practical options for managing sediment, pathogens, Nitrogen and Phosphorus discharges into the Waikato and Waipa catchments to ensure our rivers and lakes are safe to swim in and take food from and provide for social, economic and cultural wellbeing.”

The Healthy Rivers Plan for Change: Waiora He Rautaki Whakapaipai will establish targets and limits for nutrients (N & P), sediment and *E. coli* in water bodies across the Waikato/Waipā catchment.

The National Objectives Framework (NOF) in the amended National Policy Statement (NPS) for Freshwater Management (2014) provides a framework for defining values, their attributes and attribute states (A-D) that relate to the achievement of these values. Population of the NOF to date is rather limited, with ecosystem health and human health (nationally compulsory values) linked to a relatively narrow range of attributes. The Māori values and attributes are in their formative stage and do not provide comprehensive or articulate measures that can be immediately picked up and incorporated into a Waikato Objectives Framework. The Collaborative Stakeholder Group have considered this and are in the final stages of confirming a list of values to be used in the Waikato Objectives Framework (WOF). The list includes a number of iwi-centric values that will benefit from further exploration to identify influencers and attributes, some of which may be applicable to use as measures.

A key challenge in incorporating Mātauranga Māori into the healthy rivers project is the broad values framework, inter-related and holistic perspectives of River Iwi and the differences in attribute identification. There has been limited work conducted at a national level requiring a base line of information for the Healthy Rivers project currently and moving forward, identifying potential criteria and indicators for assessing impact of policy, supporting and informing

indicators and attributes including understanding the context of the impacts of N, P, pathogens and sediment on iwi values associated with rivers.

The following are the expected outcomes of the project:

1. Identifying the important underlying values related to swimming, mahinga kai and special characteristics of water.
2. An understanding of the factors from a Mātauranga Māori perspective, that support/enhance and constrain/decrease:
 - a. Iwi members swimming in rivers
 - b. The taking of mahinga kai from rivers and lakes (fish, shellfish, waikarihi)
 - c. Sense of place, identity and relationships, wai tapu, tauranga waka.
3. If there are any factors/influencers that may be useful for describing and/or measuring the quality of the above values.
4. Identifying any relationships between Mātauranga Māori perspectives and the 4 contaminants.
5. Provide a body of Mātauranga Māori to support further work in the Healthy Rivers project.
6. Identification of key species of significance to Iwi
7. Identification of characteristics of swimming
8. Identification of Iwi values associated with swimming
9. Identification of characteristics of harvesting including fishing
10. Values associated with harvesting/fishing
11. Factors enhancing and reducing values of swimming and harvesting
12. Factors enhancing and reducing specific species
13. Common themes (if any) amongst key species, characteristics of swimming and associated iwi values, factors enhancing or reducing values of swimming and harvesting.

KAUKAU – SWIMMING

Characteristics of swimming

The terms *kau* and *kaukau* are commonly used to describe swimming, bathing and wading (across water).² More formally this is moving the hands and feet to push the body through the water. *Ka whakakorikori i nga ringa me nga waewae e tere haere ai te tinana i te wai.*³ Participants at the workshop were asked what they understood swimming to be. They confirmed that swimming is:

- being fully immersed in the river or lake or ocean;
- an activity that occurs all year round, at familiar and traditional places;
- It's an activity that's healing, cooling down, fun, cleaning, educational, collecting kai, reconnecting; and
- involves ingestion of the water.

² H.W. Williams. Dictionary of the Maori Language. Reprint 1992. Pp104-105

³ Te Taurawhiri i te reo Maori. He Pataka Kupu. 2008

Some of the assumptions tested with participants at the workshop was the seasonality of swimming, the places of swimming, the length of time spent swimming and immersion of the body. The assumptions were that swimming occurs:

- mostly during warm summer months, particularly holidays;
- at familiar and popular swimming places; and
- for short periods of time and involves full immersion of the body.

Participants at the workshop confirmed the above and added:

- swimming occurs all year round. Some of the swimming places in winter are family favourites, including geothermal heated places; and
- swimming may be for minutes or several hours.

The importance of swimming

During the workshop, iwi experts and kaumatua, regarded swimming in it's past, present and future context. Swimming was seen as a way of connecting through a place and activity to a tradition, ancestors and family. By swimming it not only has social and recreational value, it has a deeper and more meaningful connection to place, time, and people. Some of the statements from the workshop support this sense of connection.⁴

- Swimming enables people to become knowledgeable in areas of the awa and moana (wāhi tapu, rāhui);
- Knowledge of kaitiaki, taniwha and tikanga related to awa and moana;
- Kaukau [is] important for whanau and visitors (tourism);
- Cleansing for hauora/healing;
- Whanaungatanga;
- Play/recreation;
- 'Ko au te awa, ko te awa ko au' (I am the river, the river is me); and
- Improves health and well-being.

The literature review did not reveal a wealth of information that articulated why swimming was important to River Iwi. Several statements such as swimming is '*part of re-energizing the relationship between the iwi and the streams and rivers*⁵ and '*swimming is the main recreational activity*⁶ go some way to supporting earlier statements from the workshop. At a hui with Raukawa kaumatua, similar sentiments were shared.⁷ These being that swimming was important for:

- Keeping clean;
- Knowledge transfer;
- Whanaungatanga;
- Place for kids;
- Relief from heat;
- Cleansing; and
- Joy/play.

⁴ Mātauranga Maori Wananga. Karapiro Boat Shed. 23 March 2015.

⁵ Ngāti Kearoa-Ngati Tuara, n.d., p. 24

⁶ WRISS. Raukawa Report.

⁷ Hui with Raukawa Kaumatua at Tokoroa Sports Club. 11 March 2015.

Factors affecting swimming from a Māori perspective

Key themes regarding swimming followed one or more of the following; the physical characteristics of the swimming place and its surrounds, safety, water quality and quantity, familiarity and tradition.

In the literature review factors that underpinned a good swimming place included, good physical access, seeing the bottom or good water clarity, safe environment and water flow (for swimming). Factors that described a poor swimming place were:

- Poor water quality (faecal bacteria and low clarity)
- Algal blooms (particularly in lakes)
- No access
- Low flow or water levels
- Weeds
- Bank erosion
- Pest fish
- Sediment build up
- Rubbish
- Willows
- Dangerous.

Based on past recollections, the characteristics of a good swimming area (puna kaukau) included being able to clearly see the bottom of the river and a sandy or stony river bed. (NIWA 2014. Ngāti Maniapoto)

At the Mātauranga Māori workshop, participants emphasised the relationship between the activity of swimming and mahinga kai. For example, knowing the best time for swimming, the best time for fishing and steeping food in the river. (e.g. when rivers are flooded is a good time to swim, catch eel and set for rotten corn). Participants saw mahinga kai as a primary activity and swimming as a supporting or complimentary activity. This was qualified for children, who would be more focussed on the swimming and play.⁸

When asked what factors reduced the value of swimming iwi experts and representatives identified:

- A lack of knowledge;
- People are frightened of drowning and stories;
- Poor clarity of river;
- Safety hazards in the rivers;
- Algal blooms;
- Knowing that there are pollution sources nearby; and
- Visually dirty.

The *lack of knowledge* factor was intended to be a wide encompassing factor that includes knowledge of the history of a place, the location and nature of wāhi tapu, seasonal foods, and natural signs and spiritual omens. *People are frightened of drowning and stories* is influenced

⁸ Mātauranga Maori Workshop

by several factors, including safe and modern swimming pools and traditions related to dangerous places to swim. *Safety hazards in the rivers* was focussed on tree debris.

Swimming and the four contaminants

The four contaminants for the Healthy Rivers Waiora project are nitrogen, phosphorus, sediment and pathogens. Of these, sediment and pathogens (faecal bacteria) were most often expressed by iwi literature and in the workshops affecting swimmability. Nitrogen and phosphorus did not feature greatly. A number of iwi documents identified nutrient sources which would most likely include nitrogen and phosphorus and, symptoms such as algal blooms and weeds were mentioned, however these were often location specific.

As mentioned earlier the significant factors affecting swimming from a Māori perspective are the physical characteristics of the swimming place and its surrounds, safety, water quality and quantity, familiarity and tradition.

Summary of potential attributes related to kaukau

Attribute	Attribute State	Attribute Narrative
Waitemata - Water clarity	Swimmers can see the bottom of the swimming place.	River iwi members have expressed a need to see the bottom of a swimming place to be reassured it is safe and is familiar (inter-generational). This could be at the bank of the river or lake and/or in the water. This is likely to be at a human scale, that is shoulder to feet (approx. 155cm vertical)
Te Rere - flows	The historic flow of the water – speed and quantity. 1863	The historic flow of the swimming place is most often favorable to a tradition of swimming. A change to flow that makes swimming unable to be performed may be unacceptable to River Iwi.
Paemakariri - Temperature	Historic temperature of swimming places in rivers and lakes.	An expectation of swimmers and often the traditions and knowledge of a place held by experts is that rivers and lakes will have much cooler temperatures than other forms of swimming (ocean, geothermal, swimming pools)
Waipara - Settled sediment and periphyton	The depth of settled fine sediment in rocky/gravel streams is less than 2cm. The coverage of periphyton at a swimming place is less than 20%.	The feel of the bottom of the swimming place with the feet is a consistent test of swimmability for River Iwi. If the bed is slimy, this reduces the quality and acceptability of the experience.

Haumaru - Safety	The presence of debris and unseen rocks in the river or lake that is a hazard to human safety. This may relate to both water clarity above and perceptions of acceptability.	A river or lake area for swimming that is free of debris and any hazards such as rocks can be seen, avoids potential safety issues. This attribute in part relates to water clarity.
Matauranga ki nga waikaukau	The knowledge and traditions related to swimming in particular places are held by current generations.	The knowledge and experience of swimming is an important consideration in advising and directing people to swim in particular places at a particular time and any concerns that need to be addressed.
Pareparenga o te wai - Riparian margin	The quality of the river or lake bank that is conducive to swimming activity. That is; vegetation cover, stability, and access to river or lake.	The river margin is the location for access to and from the swimming place. The physical characteristics of the riparian margin influence access and acceptability for swimming.
Ara ki te wai - Access	The ability to access the swimming place from a public reserve, road, walkway is uninhibited by physical barriers.	Vegetation, fencing, structures may prevent or discourage access to a swimming place.

MAHINGA KAI / HAUANGA KAI

Characteristics of mahinga kai / hauanga kai

The term *mahinga kai* is commonly used to describe the activity of and the place of harvesting collection, hunting and gathering of food resources. *Mahinga* is derived from the word *mahi* As a verb this is; to work, be occupied with, perform, procure and as a noun; work, occupation, function, abundance.⁹ The term *kai* refers to the activity of consuming or eating food and is also the noun for food.¹⁰

Mahinga kai, literally means; garden, cultivation, food-gathering place. *Ko ngā otaota hoki o ngā pāmu kua maroke rawa atu, ānō he mea tahu ki te ahi. Waihoki me ngā tāngata Māori e auhi ana ki ā rātou mahinga kai (KO 15/1/1886:3).* / And the grass of the farms has dried off completely as if it was burnt with fire. In addition the Māori people are distressed about their gardens.¹¹

Hauanga kai is the term used by Waikato-Tainui and refers to customary and contemporary gathering and use of naturally occurring and cultivated foods.¹²

Mahinga kai is most often associated with fisheries in the iwi planning documents. This is likely to be a reflection of late 21st century emphasis on fisheries management legislation and

⁹ H.W. Williams. Dictionary of the Maori Language. Reprint 1992. p163

¹⁰ H.W. Williams. Dictionary of the Maori Language. Reprint 1992. pp85-86

¹¹ John C Moorfield. Te Aka Maori English Dictionary. 2015

¹² Waikato Raupatu lands Trust. Tai Tumu, Tai Pari, Tai Ao. p102, 259

competing commercial and recreational users. But there are references to other kai in literature, such as watercress, shellfish, koura, birds, potatoes and puha. Later in this section is a full list of mahinga kai species identified by iwi.

At the Mātauranga Māori workshop, participants were asked to define mahinga kai. Iwi experts and representatives couched mahinga kai in terms of observations and memories of undertaking the activity of collecting kai. The key themes were methods of collecting kai, abundance of certain species and the short time it took to collect kai, storing kai and hospitality.¹³ Mahinga kai was seen by participants as not just involving the very specific function of catching/collecting kai. For instance fishing for tuna would involve the making or repair of hinaki, travelling to the river, lake or stream, baiting and setting the hinaki, and the return to the site, collecting the tuna, post-harvest preparation of the meat, drying/smoking and storage.

The location for mahinga kai is associated to the location of the harvest species. These are of course not just in-stream (for fish, shellfish, watercress) but beside streams (puha, birds' nests and perches), wetlands and clearings (gardens).

The importance of mahinga kai

The importance of water and food for sustenance of the individual, family, community, and ultimately the iwi is paramount. In a subsistence economy, such as pre-1864 river Iwi, the survival of a communities relied on a sustainable and dependable water and food supply from a range of sources. This provided immediate day to day nutrition but also through preserving, fermenting, drying, smoking and other techniques medium term storage for periods where harvesting was not possible (poor weather, cold seasons) and large events (feasts, celebrations). Fish and shellfish from rivers, streams, lakes and coastal areas, birds from forests and waterfowl from streams, forest fruits, berries, roots and macrophytes, fungi and mushrooms, insect larvae and in more recent times watercress all contributed to the diet of River Iwi.

Raukawa traditions state Rakatāura also deposited at Pureora one of the mauri stones brought from Hawaiki to Aotearoa. This stone was a talisman used to attract birds into an area. From that day forward, Pureora became one of several famed bird snaring areas used by Raukawa hapū to hunt kērerū and other native birds.

Pureora was a valuable source of food for Raukawa hapū, particularly the wide variety of birds and other plant life including pereie, similar to kūmara but tubular in appearance. According to Raukawa tradition, a great feast was held in commemoration of the marriage between Te Rangipūmao and a woman from a neighbouring iwi. The food for this wedding was gathered from Pureora and Kaipere. Pureora also contains numerous waterbodies and mahinga kai of significance to Raukawa. The waterbodies of Huruhurumāku were so named due to the tupuna, Hā dropping his taiaha in the waters and the feathers that adorned the taiaha getting wet. Other waterbodies such as Kākāhō, Pūrākaukerea and the Puketapu streams were sources for Raukawa of food such as tuna (eels) and kōura (freshwater crayfish) as well as the daily water supply. The waterbodies were also used for healing.

Pureora is also renowned for having an abundant supply of poaka (pigs). According to some kaumātua, this area was vastly hunted to supply meat to many of the pā in the Te Pae-o-Raukawa rohe (area). Large mahingā kai (gardens) were grown around the pā to help supply

¹³ Mātauranga Maori Workshop. 23 March 2015

food for the people and their manuwhiri (visitors), especially when the occasion was for a tangihanga (funeral).¹⁴

Over many generations techniques and methods for mahinga kai were practised and perfected. The activity of mahinga kai became a tradition and favoured spots were protected and revered through rituals, ceremonies and practises that passed knowledge from one generation to another. Mahinga kai became more than just the procurement of food for survival. Particular species became iconic to a community. The practise of manaakitanga (hospitality) was often an expression of a community's wealth and particular species were often associated with a place or community. Manaakitanga is an important part of modern Māori society where guests are welcomed, accommodated, provided food and refreshments and wished safe passage. Food plays a key role in Māori culture including the process and ethic of manaakitanga. The quality and quantity of the food is a show of wealth, prestige and generosity, all aspects of mana. The provision of delicacies or specialities from the area, such as specially prepared fish, birds and forest foods are among the most prized and prestigious. Much notoriety can be gained from manaakitanga.

Medicinal uses for kai and new methods of preserving food added to the foundation of a subsistence economy. Today, whilst iwi may not rely so much on mahinga kai for survival, it is still an important part of the identity of an iwi, a body of knowledge and a range of activities that connect people to their ancestors and the environment. Iwi have also expressed the view that kai species are important in their own right as part of the environment. This stems from Māori cosmology where every part of the natural world has a whakapapa or genealogical connection to Atua and the primal parents Ranginui (sky father) and Papatuanuku (earth mother).

Factors affecting mahinga kai from a Māori perspective

River Iwi have extensive lists of factors affecting mahinga kai including specific species in literature. The most often identified factors affecting mahinga kai are loss of habitat and water pollution. The following table contains a list of key pressures impacting on native fish.

¹⁴ Raukawa Charitable Trust. Te Rautaki Taiao a Raukawa. 2015. pp187-188

Key pressures identified	Comments
<ul style="list-style-type: none"> • Introduced fish 	<ul style="list-style-type: none"> • Trout for example eat eggs and young native fish, or take their food
<ul style="list-style-type: none"> • Pest fish 	<ul style="list-style-type: none"> • Brown bullhead catfish found throughout the Waikato river catchment eat native fish and invertebrates • Koi carp uproot water plants, eat insects, stir up mud and eat young native fish • Gambusia (mosquito fish) which live in shallow wetlands, streams and ponds attack native fish such as whitebait and mudfish and eat their eggs • Wild goldfish eat plants and insects and encourage blue-green algae
<ul style="list-style-type: none"> • Pest plants 	<ul style="list-style-type: none"> • Alligator weed and yellow flag iris in the lower Waikato replace whitebait spawning habitat • Willow replace native plants and block waterways
<ul style="list-style-type: none"> • Commercial and recreational fishing 	<ul style="list-style-type: none"> • Some whitebait species and longfin eels are becoming scarce due to over fishing
<ul style="list-style-type: none"> • Dams and culverts 	<ul style="list-style-type: none"> • Challenging for migrating fish to pass such as tuna and whitebait
<ul style="list-style-type: none"> • Loss of habitat 	<ul style="list-style-type: none"> • Includes reduced wetlands, river and stream straightening, water takes, loss of stream vegetation
<ul style="list-style-type: none"> • Water pollution 	<ul style="list-style-type: none"> • Caused by nutrients, pesticides, sediments, chemicals

Key pressures impacting on native fish identified by the NZ Landcare Trust (2014)

As part of the Waikato River Independent Scoping Study (WRISS) (NIWA, 2010) with Tuwharetoa, Te Arawa River Iwi Trust, Raukawa, and Waikato-Tainui a summary of the mātauranga of mahinga kai species was provided. The table below shows alongside mahinga kai species the key pressures impacting each.

Mahinga kai species	Summary of state	Key pressures identified
Eel (tuna)	<ul style="list-style-type: none"> • Important part of the traditional Māori diet • Highest priority species identified for restoration • Used to be in plentiful supply, however tuna stocks have declined significantly 	<ul style="list-style-type: none"> • Hydro dams • Disconnection of the Awa from the surrounding waterways • Discharges • Commercial fishing • Koi carp
Whitebait (includes inanga, kokopu, and koaro)	<ul style="list-style-type: none"> • Important kai species for River Iwi especially in the Lower Waikato • Used to be plentiful but populations are declining 	<ul style="list-style-type: none"> • Decreased water clarity • Competition with commercial and recreational fishers forcing whānau out of

		<p>traditional whānau based areas</p> <ul style="list-style-type: none"> • Point and non-point source discharges including farming, sewage, industry • Reduction of habitat and spawning sites • Koi carp • Pest plants • Reduced wetlands • Forestry
Lamprey (piharau)	<ul style="list-style-type: none"> • Important kai species • Piharau fishery has significantly declined over the last 50 years • Used to be seasonal sites for catching piharau at Turangawaewae and below the Karapiro dam 	<ul style="list-style-type: none"> • Hydro dams and associated habitat and loss • Pollution • Pest plants • Koi carp • Reduced wetlands
Porohe	<ul style="list-style-type: none"> • Mentioned as being caught in the Lower Waikato at Turangawaewae and Lakes Whangape and Waikare. • Have not been able to source 	<ul style="list-style-type: none"> • Poor water quality
Black flounder (pātiki)	<ul style="list-style-type: none"> • Most commonly harvested by Waikato-Tainui • Used to be collected as far as the lower Waikato lakes • Numbers have declined 	<ul style="list-style-type: none"> • Poor water quality • Disconnection of the awa from the surrounding waterways • Koi carp
Mullet (kanae)	<ul style="list-style-type: none"> • Most commonly harvested by Waikato-Tainui • Used to be caught all along the awa up to Karapiro dam as well as lower Waikato lakes 	<ul style="list-style-type: none"> • Commercial fishing • Disconnection of the awa from the surrounding waterways • Koi carp • Pest plants • Pollution • Poor water quality
Freshwater mussels (kaeo, kakahi)	<ul style="list-style-type: none"> • Used to be plentiful all along the Waikato River catchment and considered an important mahinga kai species • Have over time observed a decline in numbers and not as healthy 	<ul style="list-style-type: none"> • Poor water quality • Hydrodams slowing water flows and pest weeds growing in hydro lakes negatively impacting habitat of freshwater mussels • Reduced wetlands
Freshwater crayfish (koura)	<ul style="list-style-type: none"> • Was available to all Waikato River Iwi throughout the catchment, including the 	<ul style="list-style-type: none"> • Removal of native forest

	<p>mainstem, lower Waikato lakes, hydro lakes and springs and tributaries along the river</p> <ul style="list-style-type: none"> • Populations are declining and rare in some parts of the catchment • Presence of koura considered to be a good indicator of waterway health 	<ul style="list-style-type: none"> • Impacts of non-point source discharges such as farming • Natural geothermal characteristics of the upper catchment • Catfish in Lake Taupo
Watercress	<ul style="list-style-type: none"> • Was plentiful throughout the Waikato River catchment and formed an important part of the staple diet of River Iwi • Is no longer abundant and becoming more difficult to find 	<ul style="list-style-type: none"> • Operating regimes of hydrodams • Point source and non-point source discharges • Pest weeds • Farming practices eg. Sprays • Reduced wetlands • Pollution • Access due to private land ownership and weed growth eg. blackberry

Taken from Table 1: Summary of mahinga kai species and pressures from the WRISS study

Other factors affecting mahinga kai are safe access¹⁵, flow of water¹⁶, rahui¹⁷, seasonal variations¹⁸, flood events¹⁹, and mātauranga²⁰.

Mahinga kai and the four contaminants

The four contaminants for the Healthy Rivers Waiora project are nitrogen, phosphorus, sediment and pathogens. As mentioned above the most often identified factors by River Iwi affecting mahinga kai are loss of habitat and water pollution. The reduction of forest and wetland habitat feature most strongly, with reduction in the quality of in-stream environments also being mentioned in literature. 'Water pollution' appears to be the most relevant factor related to the four contaminants. Water pollution is a general term and a catch-all of a range of activities including; point and non-point discharges, bank erosion²¹, wastewater

¹⁵ Maniapoto Māori Trust Board. The Maniapoto Iwi Environmental Management Plan. 2007.p7

¹⁶ Maniapoto Māori Trust Board. The Maniapoto Iwi Environmental Management Plan. 2007.p53

¹⁷ Mātauranga Maori Workshop. Karapiro. 23 March 2015

¹⁸ Mātauranga Maori Workshop. Karapiro. 23 March 2015

¹⁹ Mātauranga Maori Workshop. Karapiro. 23 March 2015

²⁰ Raukawa Charitable Trust. He Rautaki Taiao. 2015. pp67,91,103

²¹ Maniapoto Priorities for the Restoration of the Waipā River Catchment. p74

discharges²², cyanobacteria/blue-green algae²³, drainage and fertiliser application²⁴, high sediment and nutrient loads²⁵, farm run-off²⁶, and septic tanks.²⁷

Other factors that affect mahinga kai included introduced/pest plants and fish, commercial and recreational fishing, physical barriers to fish migration, sprays and forestry. Introduced pest/plants and fish, fishing, physical barriers to fish migration and sprays have minimal bearing on the four contaminants, however, forestry may if the concern is related to potential sediment load post-harvest. More inquiry of River Iwi may be needed to confirm the nature of forestry impacts on mahinga kai. Some introduced fish species are known to have an impact on water quality, for instance carp disturbing beds of lakes and rivers increasing levels of suspended sediment.

Key species of significance to River Iwi

Mahinga kai is most often associated with fishing and shellfish collection. Mahinga kai also include traditional bird hunting, harvesting forest fruits, berries, roots, shoots and mushrooms, insect larvae and in more recent times watercress.

Each Iwi have their own relationships and associations to particular species. For example, Ngāti Maniapoto fish species of importance include piharau, mullet, tuna, inanga, kōaro and kōkopu (whitebait), and trout. Kōura (freshwater crayfish), kūtāe/kāeo (freshwater mussel), watercress, puha and kānga wai are also important kai species. Birds like kereru and tītī, plants and trees like harakeke, tāwhara, kahikatea and miro are also highly valued species in the catchment.

Some of these may be in common to other River Iwi. For fisheries some of the shared and important fisheries include; tuna, koura, inanga, koaro, piharau, kakahi/kāeo and watercress.

Forest foods

Common name	Scientific name
Ti kouka (cabbage tree)	Cordyline spp.
Karaka	Corynocarpus laevigatus
Pūhā ²⁸	Sonchus spp
Pikopiko ²⁹	Fern shoots
Korau (wild turnip)	Brassia rapa
Aruhe (bracken)	Pteridium esculentum

²² Maniapoto Priorities for the Restoration of the Waipā River Catchment. p77

²³ Waikato Raupatu Lands Trust. Tai Tumu, Tai Pari, Tai Ao. p111

²⁴ Waikato Raupatu Lands Trust. Tai Tumu, Tai Pari, Tai Ao. p168

²⁵ Waikato Raupatu Lands Trust. Tai Tumu, Tai Pari, Tai Ao. p168

²⁶ Maniapoto Māori Trust Board. The Maniapoto Iwi Environmental Management Plan. 2007.p53

²⁷ Maniapoto Māori Trust Board. The Maniapoto Iwi Environmental Management Plan. 2007.p53

²⁸ Rush & others. Traditional foods reported by a Māori community in 2004.p2/ Maniapoto Priorities for the Restoration of the Waipā River Catchment. pp60,96

²⁹ Rush & others. Traditional foods reported by a Māori community in 2004. pp5-6

Kahikatea	<i>Dacrycarpus dacrydioides</i>
Miro	<i>Prumnopitys ferruginea</i>
Tawharawhara	<i>Freycinetia banksii</i>
Harakeke	<i>Phormium tenax</i>

Cultivated foods

Common name	Scientific name
Taewa, riwai (potato)	<i>Solanum tuberosum</i>
Kumara (sweet potato)	<i>Ipomoea batatas</i>
Taro	<i>Colocasia esculenta</i>
Hue (gourds)	<i>Lagenaria siceraria</i>
Uwhi (yams)	<i>Dioscorea</i> spp
Kamokamo ³⁰	<i>Cucurbita pepo</i> ssp. <i>pepo</i>
Kanga (for kanga wai) ³¹	<i>Zea mays</i>
Pumpkin ³²	<i>Cucurbita maxima</i> spp

Aquatic plants

Common name	Scientific name
Watercress (kirihi wai)	<i>Nasturtium officinale</i>

Birds

Common name	Scientific name
Parera	<i>Anas superciliosa</i>
Whio	<i>Hymenolaimus malacorhynchos</i>
Pateke	<i>Anas chlorotis</i>
Kereru	<i>Hemiphaga novaeseelandiae</i>
Kiwi	<i>Apteryx</i> spp.

³⁰ Rush & others. Traditional foods reported by a Māori community in 2004.p2

³¹ Mātauranga Maori workshop. 23 March 2015 / Rush & others. Traditional foods reported by a Māori community in 2004. pp5-6

³² Rush & others. Traditional foods reported by a Māori community in 2004.p4

Kaka	<i>Nestor meridionalis septentrionalis</i>
Tui	<i>Prothemadera novaeseelandiae</i> .
Weka	<i>Gallirallus australis</i>

Common fish species

Located within the Waikato and Waipa rivers are 19 native fish species as well as freshwater mussels, crayfish and shrimp as shown in the table below:

Common name	Scientific name
Yellow-eyed mullet (aua)	<i>Aldrichetta forsteri</i>
Short fin eel (tuna)	<i>Anguilla australis</i>
Long fin eel (tuna)	<i>Anguilla dieffenbachii</i>
Australian long fin eel	<i>Anguilla reinhardtii</i>
Lamprey (piharau)	<i>Geotria australis</i>
Torrent fish	<i>Cheimarrichthys fosteri</i>
Giant kokopu	<i>Galaxias argenteus</i>
Koaro	<i>Galaxias brevipinnis</i>
Banded kokopu	<i>Galaxias fasciatus</i>
Inanga	<i>Galaxias maculatus</i>
Short-jawed kokopu	<i>Galaxias postvectis</i>
Black mudfish	<i>Neochanna diversus</i>
Giant bully	<i>Gobiomorphus gobiodes</i>
Common bully	<i>Gobiomorphus cotidianus</i>
Redfin bully	<i>Gobiomorphus huttoni</i>
Cran's bully	<i>Gobiomorphus basalis</i>
Grey mullet	<i>Mugil cephalus</i>
Common smelt	<i>Retropinna retropinna</i>
Black flounder (pātiki)	<i>Rhombosolea retiaria</i>
Freshwater crayfish (koura/kewai)	<i>Paranephrops planifrons</i>
Shrimp	<i>Paratya curvirostris</i>

Native fish species found in the Waikato and Waipā River catchments³³

³³ Source: Maniapoto Māori Trust Board, 2014, p.20. NZ Landcare Trust, 2014, p 14.

Each iwi may have also adopted introduced species as part of their diet and traditions. Of particular note are the following.

Common name	Scientific name
Morihana	Carassius auratus
Taraute (rainbow and brown trout)	Oncorhynchus mykiss Salmo trutta

Summary of attributes related to mahinga kai

Attribute	Attribute State	Attribute Narrative
Waitemata - Water clarity acceptability	Acceptability for people to harvest and collect mahinga kai	Low levels of water clarity may still allow mahinga kai to occur, however, the acceptability to people collecting, harvesting, or catching kai may not be high due to perception water is contaminated.
He kai pai - Edible mahinga kai	Identify a suitable attribute to reflect safe to eat (fish flesh following cooking) – a safe consumption limit level for heavy metals E.coli limits suitable for watercress consumption after blanching.	Kai would be safe to harvest and eat and knowledge transfer is present (intergenerational harvest). In freshwater management units that are highly valued for providing mahinga kai, the desired species are plentiful enough for long-term harvest and the range of desired species is present across all life stages. (NOF, page66)
Te nui o nga kai te wai - Presence of mahinga kai	Density and distribution of fish species allows for catch to feed the family. (tuna, piharau, inanga, kakahi/kaeo, koura/kewai and watercress)	For this value, freshwater resources would be available and able to be used for customary use at some places (but not everywhere). In freshwater management units that are highly valued for providing mahinga kai, resources would be available for use, customary practices able to be exercised to the extent desired, and tikanga and preferred methods are able to be practiced. (NOF, page66)

Ara ki te wai - Access	The ability to access the mahinga kai from a public reserve, road, walkway is uninhibited by physical barriers.	Vegetation, fencing, structures and closing of boat ramps may prevent or discourage access to a mahinga kai.
Mātauranga Māori	Knowledge and traditions related to mahinga kai are passed from one generation to the next. The performing of mahinga kai continues.	The act of mahinga kai is the primary method of passing Mātauranga Māori from one generation to the next.

SPECIAL CHARACTERISTICS OF RIVERS

Characteristics

The Vision and Strategy objectives (a) and (c) recognise the restoration and protection of the health and wellbeing of the Waikato River; and the relationship of Waikato River iwi according to their tikanga and kawa, with the Waikato River, including their economic, social, cultural and spiritual relationships.³⁴

The characteristics of the health and well-being of the Waikato and Waipa rivers, and the intrinsic relationships of River Iwi are dynamic and evolving over time. They purvey the past, the present and the future. River Iwi have articulated the special characteristics of rivers and their relationships in several ways;

- as long traditions of occupation, settlement and use of river resources,
- values frameworks,
- conceptual models and
- policy.

These later three methods are often efforts to simplify these for use in environmental planning and decision-making processes. In all these cases there is an emphasis is communicating a holistic view with complex and overlapping values. Three are included below; the Mana Atua – Mana Tangata framework, the Mauri Wai model and the Cultural Health Index.

The Mana Atua Mana Tāngata framework shows the interconnected relationship between spiritual, intrinsic values and use values. Mana Atua represents the intrinsic values of water including the mauri, wairua and inherent mana of the water and its ecosystems in their natural state. Mana Tāngata refers to values of water arising from its use by people for economic, social, spiritual and cultural purposes.

³⁴ Vision and Strategy for the Waikato River. p6



Land and Water Forum, 2012, p71

The Raukawa Environmental Management Plan has taken the Mana Atua – Mana Tangata framework further by reflecting three domains of; mana atua (spiritual), mana whenua (physical/natural), and mana tangata (human) and these are intrinsically connected.

The *mauri wai* model has its genesis with a wananga of iwi experts held at University of Waikato in 1983. A recent version of this model is included in the Waikato – Tainui Environmental Management Plan.³⁵ The model classes water based on its state of well-being or mauri, according to the tapu of the water. A polluted and debased water is waimate (dead water) and conversely pristine water untouched by humans is waitapu (sacred water). There are four classes of water ranging from purest to most polluted.

(a) Wai Ora – Life giving and sustaining. These waters are generally regarded as pristine, sanctified water, primarily used for “higher” purposes such as ceremonial use, blessings, cleansing of chiefs etc. These waters are generally spring waters (puna), or in areas specifically designated for higher purposes. These waters must be protected.

(b) Wai Maaori – Useable for general purposes. These are waters that can be used for general purposes such as drinking, recreation, sustenance, economic use and provision for food gathering. Waters used to sustain the marae functions should be protected for marae use. Waters used for general purpose should be managed in a way that ensures the future of the tribe can be sustained.

(c) Wai Kino – Waters of limited use. These waters can still be used generally, but may have limited ability to sustain life or to be safely used due to poor water quality,

³⁵ Waikato Raupatu Lands Trust. Tai Tumu, Tai Pari, Tai Ao. 2014.

accessibility, or other limiting factors. These waters require greater management to ensure safe and optimal use.

(d) Wai Mate – Waters that have exceeded the ability to properly sustain life. These waters are regarded as not fit for human or certain productive use. To some they are identified as ‘dead’ waters, but to Waikato-Tainui, no water is regarded as being ‘dead’ as all things, including water, have mauri. Therefore, these waters must be better managed and restored to a higher quality.

19.1.3 The classification of water into the above ‘states’ of water should be determined

The Cultural Health Index used for state of the environment reporting and monitoring brings together some scientific attributes and indicators as well as Māori developed characteristics. The Māori characteristics include;

- Smell, colour, feel
- Clarity, flow
- Flora and fauna
- Wai tapu
- Access
- Use of customary resources
- Special characteristics
- Physical change
- Abundance; and
- Mana.

These can be used to conduct surveys and inventories of freshwater rivers, streams and lakes, establishing a baseline and overtime monitoring change.

At the Mātauranga Māori workshop iwi experts and representatives articulated two new frameworks reflecting special characteristics of the well-being or *mauri o nga awa*.³⁷ The first of these as a result of discussion and debate included:

- *Mauri*: as an overarching characteristic, being the life force of objects and the environment
- *Te Ao Māori, te kawai runga me te kawai raro*: The Māori world view where there are realms of the gods and realms of the people.
- *Taha wairua*: the spiritual side
- *Rangatiratanga*: the mana of rangatira and their communities to make decisions regarding their resources
- *Nga kaitiaki*: flora and fauna that provided indicators of river health and signs of safety
- *Nga taniwha*: metaphysical beings that are manifested in natural phenomenon - the river spirits.
- *Wahi tapu*: places of spiritual power and cultural significance
- *Wai*: the use of water for rituals and ceremonies

³⁶ Waikato Raupatu Lands Trust. Tai Tumu, Tai Pari, Tai Ao. 2014.

³⁷ Mātauranga Maori Workshop. 23 March 2015

- *Nga korero me nga mahi*: knowledge and experiences
- *Waiata me nga karakia*: the modes that transmit knowledge and tikanga for the river.

These special characteristics influence River Iwi sense of place, identity and connection physically, mentally and spiritually. Notwithstanding the above special characteristics of rivers, each river has a name and identity and within each river, they are localities of specific and unique importance to their iwi. The sound, the smell, the look, the feel, and the taste of kai at each river may be different. These differences, and certainly the knowledge of their differences support deep and meaningful connections between River Iwi members and rivers.

As mentioned above the Mātauranga Māori workshop participants articulated a second framework. This one was based on senses and described a method of defining the characteristics. We have named it the *5+1 senses model*.³⁸ It involves the following:

- The **look** of the river and its surrounds (physical and natural character);
- The **sound** of the water;
- The **touch** of the water (temperature);
- The **smell**;
- The **taste** of kai from the river; and
- The **wairua** of the place.

The various frameworks and models suggest there are two distinct and interrelated perspectives of River Iwi. The first is the river, stream or lake as an entity in itself that includes the land, the water, the rocks, the air, the living plants and animals, and the spiritual dimension of place. The second relates specifically to the qualities of the water. The difference between these two approaches is quite different.

Factors affecting these characteristics from a Māori perspective

During the series of hui and the Mātauranga Māori workshop a number of factors affecting special characteristics were consistently identified. These are very consistent with literature and although the list of these factors is extensive, there are a smaller number of most common factors common among River Iwi. These include:

- The ability to physically access rivers, streams and lakes
- The abundance of kai,
- Physical barriers to fish migration
- The quality of the habitat to sustain life
- The presence of pest plants and fish
- Algal blooms (particularly in lakes)
- The presence of '*te paru i te wai*' (dirty water)
- The use of water for economic, social and cultural well-being
- The flow of water
- Physical modifications
- The traditions, history; knowledge and experiences of River Iwi
- The presence of, and use of wai tapu
- The knowledge and protection of wāhi tapu and wāhi tupuna

³⁸ Mātauranga Maori Workshop. 23 March 2015

- The safety of places to swim, and
- Modification of river course.

Special characteristics and the four contaminants

The four contaminants for the Healthy Rivers Waioira project are nitrogen, phosphorus, sediment and pathogens. Nitrogen and phosphorus do not feature strongly in River Iwi literature, rather they are indirectly identified including their effects such as algal growth. Of the four contaminants, sediment and other contributing contaminants to water discolouration are most often identified by River Iwi as having a negative effect on special characteristics. The health and safety of water quality in rivers and lakes is often and consistently identified in iwi planning documents and literature. Pathogens were not specifically identified in the hui or Mātauranga Māori workshop as they are likely to be considered part of safety and sediment.

Summary of potential attributes related to special characteristics

This table sets out potential attributes for special characteristics.

Attribute	Attribute State	Attribute Narrative
Waitemata - Water clarity	The water is clear and clean for use in purification rituals and ceremonies.	Water clarity is a key Māori indicator of water health.
Ara ki te wai - Physical access	People have physical access to traditional and popular places to swim, mahinga kai and conduct rituals and ceremonies.	The physical access to rivers, stream and lakes is essential for the purposes of swimming, mahinga kai and performing rituals and ceremonies.
Te nui o nga kai i te wai - Quantity of kai species	<p>The abundance of food resources for commercial, community, family or individual.</p> <p>Mahinga kai generally refers to indigenous freshwater species, plants and birds that have traditionally been used as food. Mahinga kai provide food for the people of the rohe and these sites give an indication of the overall health of the catchment.</p>	The ability to collect kai and the presence of kai species underlies this attribute.
Ara tika mo nga ika - Fish migration	The uninhibited fish passage within freshwater rivers and streams. This could be measured by the number of barriers to fish passage and the provision of measures to reduce or mitigate barriers e.g, fish passage gates, fish ladders, capture and release programmes.	This attribute describes the distribution of freshwater fish species within catchments and the entire length of the Waikato and Waipa Rivers. Tuna, piharau; koaro and kakahi are particular species historically present in most catchments. Many of these species are highly prized and iconic to River Iwi.

Habitat	Measured/desired state articulated in a sentence or two. I think most usefully articulated as something that can be measured.	The waterbody supports healthy fisheries of species allowed to be caught and eaten
Nga tarukino me nga ika rawaho i te wai Pest plants and weeds	Pest plants and weeds may be present in small numbers.	The presence of pest plants and weeds have an effect on acceptability of a place for swimming and mahinga kai.
Economic benefit - Water use	This could be measured by financial benefit of using water.	Water use represents the importance of water as an provider of economic opportunity and sustenance. Māori interests in economic domains can be enhanced by access to waterways and appropriate allocations of clean water.
Te Rere	The historic flow of the water – speed and quantity.	The historic flow of the river contributes to the inter-generational knowledge of a water body and changes to flow can be considered a ‘tohu’ or sign of change.
Te arawaru – te tangi o te wai	The sound of the water is consistent with historic accounts.	The sound of a water body such as a river or stream is often characterized by the name, traditions and experiences of river iwi to that place. Some rivers or streams are given names in direct reference to the sound.
Wai tapu	<p>The presence of waters sacred to use for rituals and source of high quality water are available for use.</p> <p>In providing for this value, the wai tapu would be free from human and animal waste, contaminants and excess sediment, with valued features and unique properties of the wai protected to some extent. Other matters that may be important are that preferred sites are accessible (physically and legally), identified catchments have integrity (there is no artificial mixing of</p>	Encompassing values of tohi (baptism), karakia (prayer), waerea (protective incantation), whakatapu (placing of raahui), whakanoa (removal of raahui), tuku iho (gifting of knowledge and resources for future generations).

	the wai tapu), and identified taonga in the wai are protected.	
Nga korero nehera me nga mahi	The continuation of and enhancement of knowledge and experiences of the aspects related to water	River iwi experts, representatives and kaumatua have emphasized the importance of retaining and passing on knowledge regarding water and rivers/lakes/streams to future generations through traditional and contemporary modes.
Matauranga me nga kaitiakitanga ki nga wahi tapu, wahi tupuna	The knowledge and experiences related to a place are held by iwi members and can be passed on to future generations.	The heritage resources of the waterbody provide a connection for people to the culture and technologies of earlier people or communities.
Pai ki te kaukau	The acceptability of a place for swimming based on perception of swimmers.	The acceptability of a place for swimming will be based on a diversity of factors and may be influenced by personal choice and experiences.
Wehi te wai – natural form and character	The modifications of a place from its natural state is considered to be limited or usual for a dynamic environment.	The landscape of the waterbody provides a cumulative expression of natural and cultural elements, patterns and processes in a geographical area.
Rangatiratanga me te mana o nga wai	The ability to participate, have control, make decisions regarding allocation of and the management of water/a place.	The ability to influence the management of a lake, river, stream or catchment is fundamental to the ethic of rangatiratanga and mana. This in part a traditional and Treaty of Waitangi principle.

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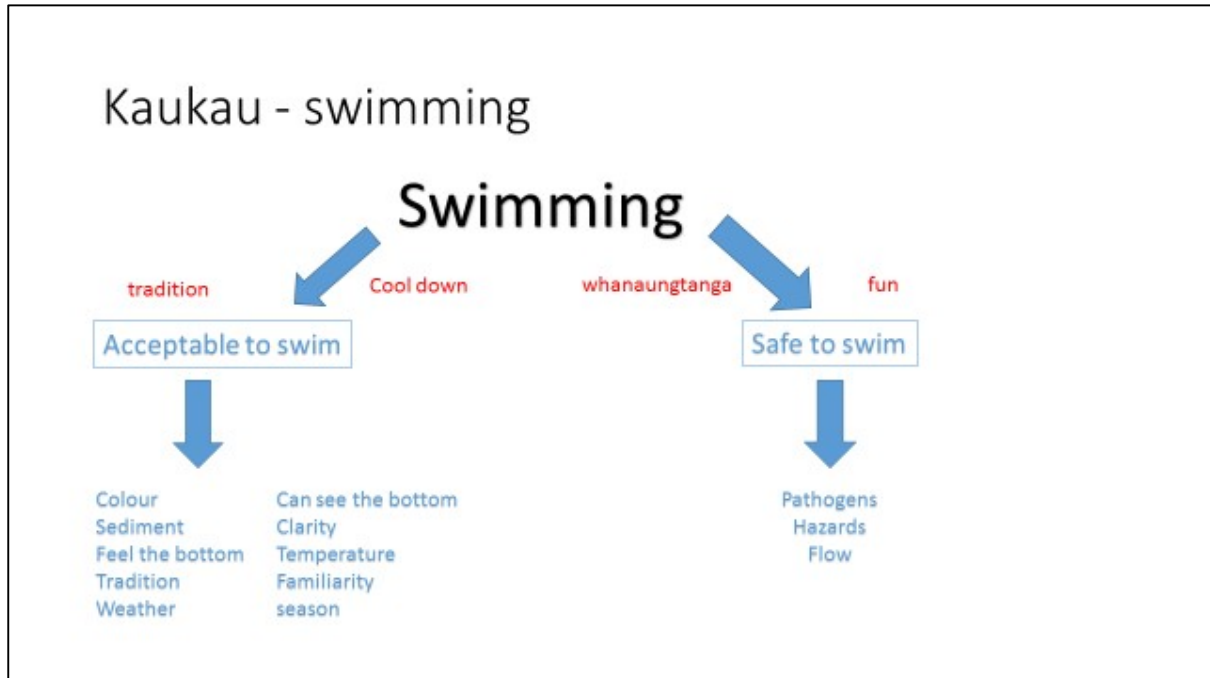
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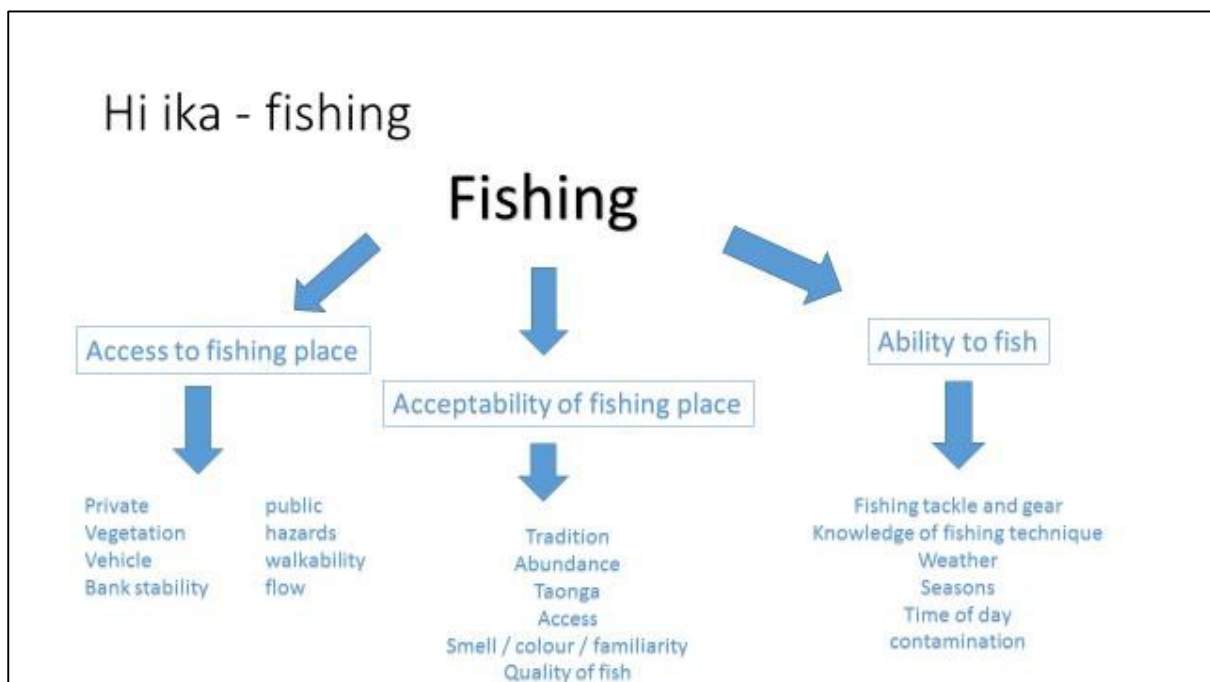
Tai Pari Tai Tumu Tai Ao, Waikato Iwi Management Plan

APPENDIX ONE - KNOWLEDGE NETWORKS

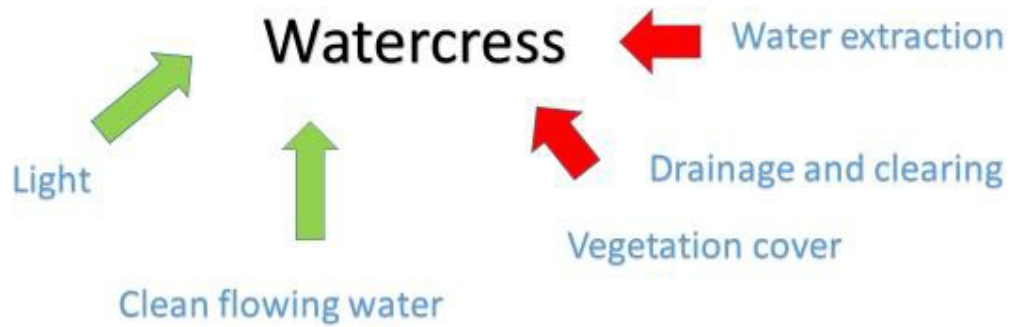
Kaukau – Swimming



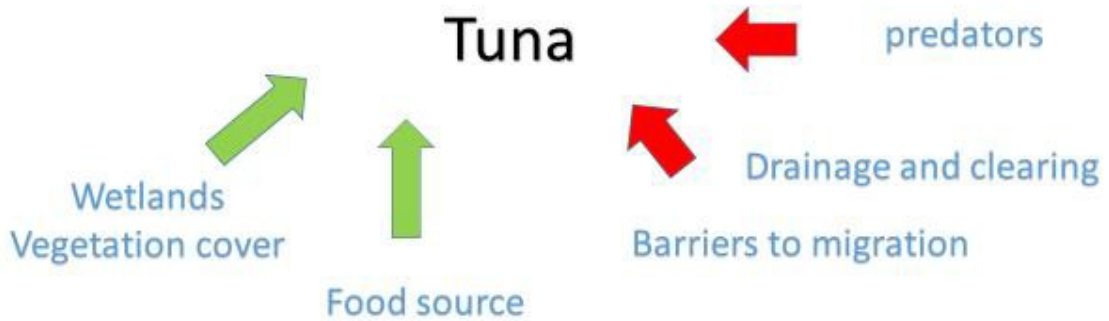
Mahinga kai/Hauanga kai – food gathering

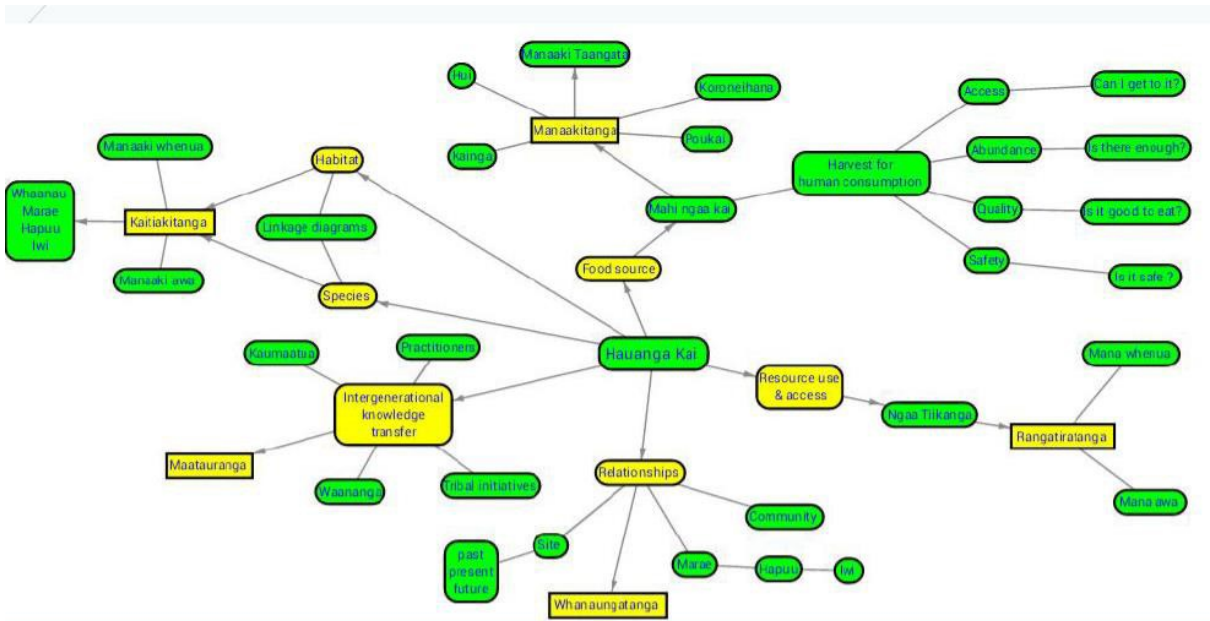
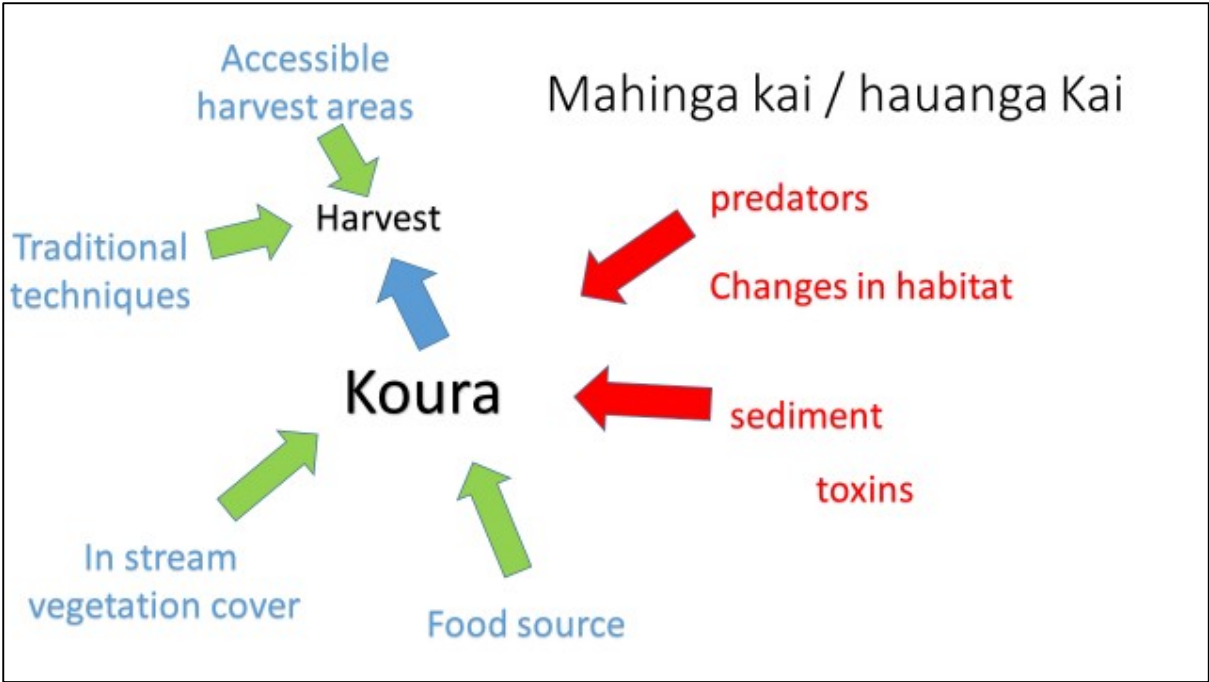


Mahinga kai / hauanga Kai



Mahinga kai / hauanga Kai





**Literature review:
Mātauranga Māori workstream -
Healthy Rivers Plan for Change:
Waiora He Rautaki Whakapaipai**

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Executive summary

The Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai project is working with stakeholders to develop changes to the Waikato Regional Plan to help restore and protect the health of the Waikato and Waipa rivers. The Vision and Strategy seeks to restore and protect the health and wellbeing of the Waikato and Waipa river systems. A key strategy for achieving this objective is the development of targets for improving the health and wellbeing of the Waikato River by utilising mātauranga Māori, as well as the latest available scientific methods.

The five Waikato and Waipa River Iwi include Tūwharetoa, Te Arawa, Raukawa, Waikato-Tainui, and Maniapoto. All river Iwi defined Mātauranga in Environmental Management Plans or Fisheries Management Plans as meaning 'knowledge'.

To assist with articulating and communicating the context of healthy rivers from a mātauranga Māori view and identifying new and potential measures, a literature review has been undertaken. The literature review focuses on the values of swimability and safe collection of mahinga kai, as these values are expressly identified as targets to be achieved in the Vision and Strategy for the Waikato and Waipa rivers.

River Iwi identified numerous mahinga kai species as being significant and contributing to environmental, social and cultural wellbeing. The decline in numbers and quality of mahinga kai species is recognised as being a significant concern. While native species were of most value, introduced species such as trout were also considered to have some value as mahinga kai. However the impact of introduced species on native populations was recognised as an issue and many introduced species were considered to be pests. Several indicators are used to measure the state of mahinga kai, including abundance of native species in relation to exotic species.

River Iwi identified a number of threats to river swimability, including poor water quality (algal blooms, bacteria, presence of heavy metals, and increased sediment levels), loss of access, hydrodams affecting flow, presence of weeds, and bank erosion. While some parts of the rivers were identified as being safe places to swim, it was considered that the number of safe places had been declining.

Introduction

The Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai project is working with stakeholders to develop changes to the Waikato Regional Plan to help restore and protect the health of the Waikato and Waipa rivers. Waikato and Waipa River iwi have a key role alongside the Waikato Regional Council as partners set out in settlement and co-management legislation for the Waikato and Waipa rivers. The five Waikato and Waipa River Iwi include Tūwharetoa, Te Arawa, Raukawa, Waikato-Tainui, and Maniapoto.

A strong sense of identity and connection with land and water (hononga ki te wai, hononga ki te whenua) is apparent through the Vision and Strategy and the many values associated with the rivers. They are home to a variety of mahinga kai species including fisheries that River Iwi had for many generations an abundant supply of. They are used for recreational activities such as swimming, and for water supply and transport. They are also wai tapu – places of spiritual and cultural significance. While all these values are still important to iwi, a number of factors have made these values more challenging for iwi to enjoy.

The Vision and Strategy seeks to restore and protect the health and wellbeing of the Waikato and Waipa river systems. A key strategy for achieving this objective is the development of targets for improving the health and wellbeing of the Waikato River by utilising mātauranga Māori, as well as the latest available scientific methods.

Purpose

To assist with articulating and communicating the context of healthy rivers from a mātauranga Māori view and identifying new and potential measures, a literature review to support a knowledge network programme was proposed. It is intended that Waikato/Waipā River iwi centric literature and projects will be captured as part of the review.

The Healthy Rivers Plan for Change: Waiora He Rautaki Whakapaipai will establish targets and limits for nutrients (Nitrogen and Phosphorus, sediment and *pathogens*) in water bodies across the Waikato/Waipā catchment to meet broader objectives of safe to swim, safe to take kai and well-being of rivers.

Incorporating mātauranga Māori into the healthy rivers project is a key part of the plan change and achieving the objectives of the Vision and Strategy. However the broad Māori values framework, inter-related and holistic perspectives of river iwi, and the specific and attribute focus of the Healthy Rivers plan change makes the incorporation of mātauranga Māori a significant challenge. Māori values and attributes are in their formative stage and do not provide comprehensive or articulate measures that can be immediately picked up and incorporated into a Waikato Objectives Framework.

This work has a number of purposes including:

- Assisting with the need to contextualise the focus of the four contaminants
- Improving understandings of the influence and interdependencies of mahinga kai species, swimmability, and Māori characteristics of healthy rivers
- Assisting in identification of gaps in knowledge that will ultimately inform the development of objectives, policies and other provisions in the Waikato Regional Plan.

Scope

It is expected that a combination of values, attributes, influencers and measures can be drawn from existing literature and programmes. The literature review focuses on the values of swimability and safe collection of mahinga kai, as these values are expressly identified as targets to be achieved in the Vision and Strategy for the Waikato and Waipa rivers. It is acknowledged that the values associated with the rivers is much broader than swimability and collection of mahinga kai. Some new work may need to be conducted to provide a comprehensive picture of river health from a Māori-centric view, and this literature review may assist in determining where some of those gaps that require further work might be.

Key outputs

The literature review seeks to identify the following matters:

- River Iwi definitions of mātauranga
- Identification of key species of significance to Iwi
- Identification of characteristics of swimming
- Identification of Iwi values associated with swimming
- Identification of characteristics of harvesting including fishing
- Values associated with harvesting/fishing
- Factors enhancing and reducing values of swimming and harvesting
- Factors enhancing and reducing specific species
- Common themes (if any) amongst key species, characteristics of swimming and associated iwi values, factors enhancing or reducing values of swimming and harvesting.

Literature review structure

The following sections provide an overview of mātauranga Māori, mahinga kai species, swimability, and characteristics of healthy rivers held by the five Waikato and Waipa River Iwi; Ngāti Tūwharetoa, Te Arawa, Raukawa, Maniapoto and Waikato-Tainui. This is followed by a summary of mahinga kai species for River Iwi and key pressures impacting species.

Mātauranga Māori defined in literature

“Ko te Mātauranga Māori, i roto i tōna horopaki tuku iho, ko te mātauranga, ko te mōhiotanga, ko te māramatanga rānei ki ngā mea katoa e kitea ana, ki ngā mea katoa e huna ana, i te ao tukupū.”

'Mātauranga Māori in a traditional context means the knowledge, comprehension or understanding of everything visible or invisible that exists across the universe.'Mātauranga Māori"

(Mohi, 1993)

Mātauranga Māori is a term for a body of knowledge that was first brought to Aotearoa by Polynesian ancestors of present day Māori. In very broad terms, Mātauranga Māori is

traditional Māori knowledge – the body of knowledge originating from Māori ancestors, including the Māori world view and perspectives. (Proposed Waikato Regional Policy Statement, 2012). Mātauranga grew and changed according to the experience of living in Aotearoa. When ancestors of modern Māori arrived in Aotearoa they were met by varieties of flora and fauna, climate and geography they had not known or experienced in central Polynesia. Hence, their knowledge needed to grow to account for these new phenomena. However mātauranga was significantly impacted upon following European arrival and colonisation. Not only were traditions and knowledge suppressed, but ‘western science’ began to prevail as the basis on which the land and the water were managed. However, despite colonisation, important fragments and portions – notably the Māori language – remained so that it was, and is, possible to speak of an unbroken tradition or continuum of Māori knowledge (Te Ahukaramu Charles Royal, 2009).

Mohi (1993) described mātauranga Māori in both traditional and modern contexts. In a traditional context mātauranga Māori being “the knowledge, comprehension or understanding of everything visible or invisible that exists across the universe” and within a modern context as “Māori research, science and technology principles and practices”. Walker (2008) elaborates on this perspective, stating that mātauranga Māori is not based on Western “objective” notions or models of science, as mātauranga parameters are wider than this and includes such things as traditional religion, belief and ceremony. Walker stated that the role of mātauranga is “to preserve and protect (while utilising) the environment and all taonga related to the environment”.

An important aspect of mātauranga Māori is that it is dynamic, in both a temporal and spatial sense. Thus from one iwi to another, even one hapu to another, mātauranga can change in values and concepts. Mead (2012) describes how in traditional Māori society, the pool of knowledge was closely related to the daily lives of the people:

“Individual members needed both the knowledge base and the cautions within the base in order to deal with the realities of their world. In their interactions among themselves and with the environment they added their interpretations and made their contributions to the knowledge base. They were able to amend some earlier ideas and were certainly able to introduce new ideas. It follows that while there might be a commonly shared base among all of the tribes of the nation, there were bound to be portions of knowledge that were unique to each community, be they whānau, hapū, or iwi”

(Mead, 2012)

Doherty (2012) described the specificity of mātauranga at a tribal level:

“Mātauranga ā-iwi is tribal knowledge. Tribal knowledge is defined as the relationship between the tribe and its land base. Mātauranga ā-iwi is knowledge specific to an iwi and its rohe. It is the exchange between the rohe and the iwi that provides the context for mātauranga ā-iwi. As the iwi engages with and describes its environment, the basis for mātauranga ā-iwi is established. The application of the principles and values in mātauranga Māori occurs, though each iwi has its own particular process that links their particular rohe and people together.”

Where recorded in the literature of the five river iwi, the specific iwi definition or meaning of mātauranga Māori is recorded in the river iwi specific sections below.

Tuwharetoa

Protecting the life giving energy of the waters of Lake Taupo and the Waikato River are part of the kaitiakitanga of tangata whenua over this taonga

(Ngati Tuwharetoa Māori Trust Board, 2002, p. 61)

Ngāti Tūwharetoa hold manawhenua and kaitiakitanga over the central plateau rohe and have a rohe boundary that has been supported by the Native Land Court in 1886, subsequently called the Taupo-nui-ā-Tia block. As kaitiaki, ngā hapū o Ngāti Tūwharetoa have an intrinsic duty to ensure that the mauri and therefore the physical and spiritual health of the environment is maintained, protected and enhanced.

(Ngati Tuwharetoa Māori Trust Board, 2002, p. 10)

Mātauranga Tuwharetoa

For Tuwharetoa, a key goal of achieving Kaitiakitanga is promoting and protecting the mātauranga held by kaitiaki for the benefit of current ngā hapū o Ngāti Tūwharetoa. Tuwharetoa seek to ensure that mātauranga and Kaitiakitanga principles and practices are integrated into all aspects of resource management decisions at local and regional government levels. (Tūwharetoa Māori Trust Board, 2003).

Mahinga kai species

Managing access to native fisheries for customary use and the protection of mahinga kai is an important responsibility for Tūwharetoa Māori Trust Board in their rohe (Tūwharetoa Māori Trust Board & Environment Waikato, 2004). Depletion of species is a concern. For example Tūwharetoa hui participants as part of the WRISS study (NIWA, 2010d) commented on how koura, kakahi, kokopu and tuna had declined significantly, with kokopu especially rare to find. Other mahinga kai species mentioned were watercress, ducks, taewa (Māori potato), morihana, rainbow and brown trout, and koaro (NIWA, 2010d).

In terms of their fisheries, key goals for Ngāti Tūwharetoa include: being able to:

Assert and exercise tino rangatiratanga and kaitiakitanga of ngā hapū o Ngāti Tūwharetoa over fisheries within the Tūwharetoa rohe.

Protect and enhance fisheries within the Tūwharetoa rohe in accordance with the tikanga and kawa of ngā hapū o Ngāti Tūwharetoa.

(Ngati Tuwharetoa Māori Trust Board, 2002, p. 30).

Though focused on the Lake Taupo catchment, the *2020 Taupō-nui-ā-Tia Action Plan: An Integrated Sustainable Development Strategy for the Lake Taupō Catchment*, provides a useful series of monitoring indicators regarding plants and animals in the Lake and rivers. The table below shows some of the indicators and measures regarding diverse plants and animals (Tūwharetoa Māori Trust Board & Environment Waikato, 2004).

Table 2: Lake Taupo catchment indicators for diverse plants and animals

Indicator	How measured	Target, guideline or standard
Water quality for ecological health (rivers and streams)	<ul style="list-style-type: none">• Black disk• Temperature• Dissolved nitrogen	<ul style="list-style-type: none">• Ecological health is in the "satisfactory to excellent range"

	<ul style="list-style-type: none"> Dissolved and total phosphorous pH 	
Number of native fish	<ul style="list-style-type: none"> Abundance of koura, koaro and other native fish at selected locations 	<ul style="list-style-type: none"> Number of native fish remains stable
Number of catfish	<ul style="list-style-type: none"> Catfish abundance at selected locations 	<ul style="list-style-type: none"> Number of catfish remains stable
Plant and animal pests	<ul style="list-style-type: none"> Monitoring the Regional Pest Management Strategy (weeds by type) 	<ul style="list-style-type: none"> Achieve targets set in the Regional Pest Management Strategy

Source: Tūwharetoa Māori Trust Board & Environment Waikato, 2004

Within the WRISS study and the 2020 Taupō-nui-ā-Tia Action Plan a number of key pressures were identified as impacting mahinga kai and plant and animal species as shown in the table below.

Table 3: Ngāti Tūwharetoa – key pressures on mahinga kai species

Key pressures identified	Comments
<ul style="list-style-type: none"> Hydrodams 	<ul style="list-style-type: none"> Effecting flow characteristics Fluctuating lake levels
<ul style="list-style-type: none"> Pest species 	<ul style="list-style-type: none"> Animals and plant pests that threaten native vegetation such as catfish
<ul style="list-style-type: none"> Poor water quality 	<ul style="list-style-type: none"> Nutrient enrichment caused by farming Sediment Erosion Contaminants (natural and anthropogenic) affecting native fish populations
<ul style="list-style-type: none"> Loss of habitat 	<ul style="list-style-type: none"> Includes impacts of farming and industry, clearance of stream vegetation Deforestation causing erosion and removing habitats Concern with conversions from forestry to farming
<ul style="list-style-type: none"> Loss of access 	<ul style="list-style-type: none"> Includes legal and physical access
<ul style="list-style-type: none"> Over fishing 	<ul style="list-style-type: none"> Commercial and recreational fishing depleting stocks
<ul style="list-style-type: none"> Geothermal power station 	<ul style="list-style-type: none"> Negative effects of contaminants

Source: NIWA, 2010d

Tūwharetoa Māori Trust Board & Environment Waikato, 2004

Swimming

Being able to swim safely is important to Ngāti Tūwharetoa. For example Tūwharetoa hu participants in the WRISS study mentioned how they used to swim in Lake Atiamuri, Lake Aratiatia and Lake Whakamaru. The concern now however was these areas were considered not as safe as they used to be (NIWA, 2010d).

The pressures on safe swimming included poor water quality, loss of access, hydrodams affecting flow, presence of weeds, and bank erosion. The 2020 Taupō-nui-ā-Tia Action Plan provides a series of monitoring indicators for safe swimming in the Lake and rivers and streams. The table below shows two of these indicators and measures (Tūwharetoa Māori Trust Board & Environment Waikato, 2004).

Table 4: Lake Taupo catchment indicators for safe swimming

Indicator	How measured	Target, guideline or standard
Water quality for recreation	<ul style="list-style-type: none"> Faecal bacteria Water clarity (Secchi Disk) 	<ul style="list-style-type: none"> Water quality for contact recreation such as swimming is “excellent”

Toxic algal blooms	<ul style="list-style-type: none"> • Number of cells of potentially toxin producing algae • Amount of toxins (if the guideline value for numbers of cells is exceeded) 	<ul style="list-style-type: none"> • Number of native fish remains stable • Number of cells meet current guideline value for recreational waters
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Source: *Tūwharetoa Māori Trust Board & Environment Waikato, 2004*

Te Arawa River Iwi Trust

The Waikato River and its tributaries is the source of identity for Te Arawa River Iwi. The resources collected from the river and its surroundings sustained the people through nourishment, protection and clothing, as well as providing goods that were traded with neighbouring Iwi.

(Te Arawa River Iwi Trust, 2015, p. 10)

Te Arawa River Iwi Trust represents the interests of the three Te Arawa River Iwi located within the Upper Waikato River catchment area. The Te Arawa River Iwi ('affiliates') are:

- Ngati Tahu-Ngai Whaoa
- Ngati Kearoa-Ngati Tuara
- Tuhourangi-Ngati Wahiao

Mātauranga Te Arawa

The Te Arawa River Iwi Trust Environmental Management Plan 2015 defines mātauranga as 'knowledge'. For Te Arawa, Mana mātauranga is a key strategic objective. Policies in the Te Arawa River Iwi Trust Environmental Management Plan 2015 seek to ensure that Local Authorities recognise and provide for mātauranga and tikanga in resource management processes and decisions that relate to the Waikato River and its tributaries. Policies also promote the transfer of mātauranga within Te Arawa River Iwi, especially environmental knowledge that relates to the Waikato River and its tributaries (Te Arawa River Iwi Trust, 2015)

Mahinga kai species

As part of the WRISS study (NIWA, 2010) with Te Arawa River Iwi, hui participants identified a variety of native and introduced fish as well as other kai species including watercress, ducks, gardens, orchards. Unfortunately Te Arawa River Iwi have experienced a gradual loss of staple foods including tuna, whitebait, koura, kakahi and piharau (Te Arawa River Iwi Trust n.d.).

In their recently released Fisheries Plan, Te Arawa River Iwi identify customary taonga species, non-taonga species and unwanted fish in the Waikato River, between Atiamuri Dam and Huka Falls including all tributaries as shown in the following table.

Table 5: Te Arawa River Iwi - classes of fish species

Customary taonga species	Non-taonga species	Unwanted fish
Longfin eel (tuna)	Common bully	Brown bullhead catfish
Shortfin eel (tuna)	Crans bully	Rudd
Freshwater crayfish (koura)	Common smelt (porohe)	Gambusia
Freshwater mussels (kakahi)	Trout	Guppy
Lamprey (piharau)		
Koaro		
Kokopu		
Wild goldfish (morihana)		

Source: Te Arawa River Iwi Trust, 2015

Eel is a significant mahinga kai species for iwi though the longfin eel is at risk and classed as a 'declining' species. Kakahi, koaro and kokopu are also 'declining' species. Piharau is however classed as a 'threatened' species and is a significant kai species for Te Arawa River

Iwi. Morihana is an introduced species that Te Arawa River Iwi use as a source of kai and for some as rongoa. Morihana are widespread and do have the potential to stir sediment and compete with native species (Te Arawa River Iwi Trust, 2015).

Key pressures that threaten fish species have been identified by river iwi as shown in the table below.

Table 6: Te Arawa River Iwi - key pressures on fish species

Key pressures identified	Comments
<ul style="list-style-type: none"> Hydrodams 	<ul style="list-style-type: none"> Difficult for migrating fish to pass through such as tuna Flow characteristics of the river has changed causing a build up of material which otherwise would have washed downstream Fluctuating lake levels exposes habitat occupied by koura and kakahi Fluctuating flows also impact tributaries which is seen to exacerbate loss of habitat and species decline
<ul style="list-style-type: none"> Pest fish 	<ul style="list-style-type: none"> Catfish eat koura and compete with tuna for food Catfish and gambusia disturb sediment and increase turbidity
<ul style="list-style-type: none"> Poor water quality 	<ul style="list-style-type: none"> Caused by changing and intensifying land use Algal blooms, turbidity and other measures of water quality impact species distribution Elevated levels of arsenic and mercury in the water contaminating kai species
<ul style="list-style-type: none"> Loss of habitat 	<ul style="list-style-type: none"> Includes logging activities (such as deforestation and the replacement of native with pine forests), impacts of agriculture, clearance of stream vegetation, straightening of the river
<ul style="list-style-type: none"> Loss of access 	<ul style="list-style-type: none"> As part of development and change land ownership changed. Has resulted in loss of access to traditional gathering spots for Te Arawa River Iwi The destruction of traditional gathering sites has also contributed to declining species populations With iwi relocating to urban areas loss of connection with the rivers losing mātauranga or transfer of traditional knowledge

Source: Te Arawa River Iwi Trust, 2015
NIWA, 2010

Swimming

For Ngati Kearoa-Ngati Tuara, swimming is regarded as “part of re-invigorating the relationship between the iwi and the streams and rivers” (Ngati Kearoa-Ngati Tuara, n.d., p. 24). It is considered that children are more likely to value the waters they swim and play in and therefore protect in the future. The number of swimming holes are declining. Pollution and dangerous conditions restrict swimming (Ngati Kearoa-Ngati Tuara, n.d.).

Iwi participants in the WRISS study discussed swimming. Though it was noted that some areas were unsuitable due to being dangerous, it was deemed suitable for swimming in other areas. Lake Ohakuri for example was described as a place suitable for a range of recreational activities such as swimming, camping and waka ama (NIWA, 2010c).

Raukawa

“...people are inextricably linked to the environment. Our physical, spiritual and economic welfare is dependent on the welfare of the environment – first and foremost we must acknowledge and protect the natural environment and uphold the values, mātauranga and tikanga of our tūpuna. Within this context we can provide for our spiritual, cultural, social and economic needs.

From these first principles stems our vision where the natural environment and our people are nurtured and supported to enable them in turn to nurture and support each other. Achieving this requires acknowledging connections and interdependencies in the natural world and restoring and protecting these relationships and balance; including our whakapapa and kaitiaki responsibilities to each other and all species, including those yet to be born.”

(Raukawa Charitable Trust, 2014)

Mātauranga Raukawa

The Raukawa Environmental Management Plan 2015 defines mātauranga as ‘knowledge’. It describes mātauranga as ancestral and traditional information and knowledge that has been developed through the centuries and generations - the body of knowledge originating from ancestors, including the Māori world view and perspectives, Māori creativity and cultural practices.

To successfully implement the Vision and Strategy, Raukawa consider that Raukawa mātauranga must be actively supported and shared appropriately (Raukawa Charitable Trust, 2015).

Mahinga kai species

In the WRISS study (NIWA, 2010b) with Raukawa tribal members they identified a variety of mahinga kai species including: tuna, kōura, kānga wai, māra, watercress, kōkopu, kākahi, manu, kereru, trout, pūhā, pīharau, cherries, strawberries, rīwai, kamokamo, kumara and wild ducks.

Raukawa recognise and respect all native species as an important part of the environment. It is also acknowledged that “no species will survive without the habitat in which it lives and the food on which it feeds” (Raukawa Charitable Trust, 2012, p. 12). Therefore protection of whole freshwater ecosystems is important (Raukawa Charitable Trust, 2012).

For Raukawa the following freshwater species were used as a source of food: tuna, koura, pīharau, kōkopu and koaro, kaeo/kakahi. Catfish, goldfish and trout all introduced species also used as a source of food likely because of their abundance over native species. Traditionally pa tuna was utilised not only as food but also to exchange for other resources Raukawa utilise a variety of fishing methods with “knowledge developed over generations of observation and practice and passed down” (Raukawa Charitable Trust, 2012, p.13). Some methods related to fish behaviour such as catching tuna at particular stages of their life cycle.

In their Fisheries Plan Raukawa included a list of native and introduced fish species present in the Waikato, Waitoa/Piako, Waipa and Waihou river catchments as shown in the table below:

Table 7: Raukawa - Fish and shellfish species present in the Waikato, Waitoa/Piako, Waipa and Waihou river catchments

Common name (Māori name)	Scientific name
Native species	
Short fin eel (tuna)	<i>Anguilla australis</i>
Long fin eel (tuna)	<i>Anguilla dieffenbachii</i>
Australian long fin eel (spotted eel)	<i>Anguilla reinhardtii</i>
Lamprey (piharau)	<i>Geotria australis</i>
Torrent fish (panoko)	<i>Cheimarrichthys fosteri</i>
Giant kokopu	<i>Galaxias argenteus</i>
Koaro	<i>Galaxias brevipinnis</i>
Banded kokopu	<i>Galaxias fasciatus</i>
Inanga	<i>Galaxias maculatus</i>
Short-jawed kokopu	<i>Galaxias postvectis</i>
Black mudfish (waikaka)	<i>Neochanna diversus</i>
Common bully (hawai)	<i>Gobiomorphus cotidianus</i>
Redfin bully	<i>Gobiomorphus huttoni</i>
Cran's bully	<i>Gobiomorphus basalis</i>
Common smelt (pōrohe)	<i>Retropinna retropinna</i>
Freshwater mussel (kāeo/kākahi)	<i>Echyridella menziesii</i>
Freshwater crayfish (koura)	<i>Paranephrops planifrons</i>
Introduced species	
Catfish	<i>Ameiurus nebulosus</i>
Goldfish	<i>Carassius auratus</i>
Gambusia	<i>Gambusia affinis</i>
Brown trout	<i>Salmo trutta</i>
Rainbow trout	<i>Oncorhynchus mykiss</i>
Perch	<i>Perca fluviatilis</i>
Guppy	<i>Poecilia reticulata</i>
Rudd	<i>Scardinius erythrophthalmus</i>

Source: Raukawa Charitable Trust, 2012

All introduced species apart from trout and guppy are considered pest species and classed as posing an 'environmental threat' under the Waikato Regional Pest Management Strategy.

In terms of being able to determine the health of a waterway Raukawa acknowledge that they: "...may not measure in accordance with recognised scientific methods, [but] the iwi has always been attuned to the state of the environment within the rohe" (Raukawa Charitable Trust, 2012, p. 13). Raukawa use "many factors and variables in making an assessment that just seems intuitive to many. These assessments rely on the senses – what we can see, hear, smell, taste and feel; rather than necessarily what we measure" (Raukawa Charitable Trust, 2012, p. 13) Indicators that can be used to determine whether a waterway is healthy are shown in the table below:

Table 8: Raukawa – Indicators of a healthy waterway

Indicators of healthy waterway	Examples of how its measured
Water clarity	Is it free from sediment; are there any visible scums or foams?
Riverbank condition	Is it eroding? – can indicate whether there has been disturbance by stock?
Shape of the river	Is it natural or has it been altered?
Aquatic plants	Are they typical native plants; is there an issue with weeds?
Riparian vegetation	Is it healthy; does it shelter the waterway; are they the right plants?
Odour	Is there anything out of the ordinary?
Surrounding land use	Is it land use that is likely to result in contamination of waterways?
Temperature	Is the water cool enough to support fish etc?
Presence of insects, shellfish, kōura, fish	Are the species found typical; have there been any changes noticed; are they in good condition?
Flow of water	Is the flow natural or altered; is there sufficient water?
Contact and consumption is safe	Does it taste the way it should; has there been any reactions or sickness caused after contact or consumption with the water or mahinga kai?
Presence of birds	Are there birds such as kingfisher, shags or ducks that indicate a reliable source of food?
Nature of any discharges	Are there any known discharges to the waterway?
Upstream uses	Are there structures, activities etc that impact on the waterway?
Sources of food	Are there sources of food to support fish?

Source: Raukawa Charitable Trust, 2012

Raukawa identify a number of pressures on native fisheries and mahinga kai species as shown in the table below.

Table 9: Raukawa – Key pressures on mahinga kai species

Key pressures identified	Comments
<ul style="list-style-type: none"> Loss of habitat 	<p>Posed as probably the biggest threat to native fisheries and includes:</p> <ul style="list-style-type: none"> drainage and clearance of wetlands clearance of streambank vegetation including native forest and riparian vegetation (leads to changes in water temperature, light, absence of leaves, tree roots etc as food and habitat, destabilised banks) physical modification of waterways (leads to changing flow and flooding characteristics, loss of habitat) pest plants (leads to loss of habitat, food, changing light levels) barriers to fish passage (interrupts migration necessary to many species to complete stages of their life cycle) discharges resulting in reduced water quality. changing flow regimes through water takes, damming and diversion declining water quality
<ul style="list-style-type: none"> Pest fish 	<p>Environmental impacts caused by pest fish include:</p> <ul style="list-style-type: none"> reduced numbers of native fish through predation and competition hybridisation introduction or spread of parasites and diseases

Key pressures identified	Comments
	<ul style="list-style-type: none"> decline in water clarity related to changes in plankton communities habitat degradation through browsing of aquatic plants and sediment disturbance
<ul style="list-style-type: none"> Poor water quality 	<ul style="list-style-type: none"> Caused by changing and intensifying land use Heavy metal contamination caused by natural geothermal inputs and methods associated with electricity generation from geothermal energy. These are trapped by hydro lakes
<ul style="list-style-type: none"> Waikato hydro scheme 	<ul style="list-style-type: none"> Historic and on-going impact of the Waikato hydro scheme on Waikato River fisheries
<ul style="list-style-type: none"> Loss of access 	<ul style="list-style-type: none"> Changing land ownership and loss of relationships Development of the Waikato hydro scheme Drainage of wetlands Land use conversions to pine, dairy etc Increasing and complicated regulation
<ul style="list-style-type: none"> Overfishing 	<ul style="list-style-type: none"> Declining fish populations due to exploitation
<ul style="list-style-type: none"> Pest plants 	<ul style="list-style-type: none"> Invasive weeds

Source: Raukawa Charitable Trust, 2012
NIWA 2010

Swimming

As part of the WRISS study, Raukawa hui participants talked about swimming as the main recreational activity. Locations identified included, Lake Maraetai, Lake Whakamaru, Lake Arapuni, Lake Arapuni, Pokaiwhenua Stream, Lake Karapiro and Lake Atiamuri. There were a number of pressures however that impacted swimming as shown in the table below:

Table 10: Raukawa – Key pressures on swimming

Key pressures identified	Comments
<ul style="list-style-type: none"> Pest weeds 	<ul style="list-style-type: none"> For example aquatic pest weeds were associated with Atiamuri and Whakamaru dams
<ul style="list-style-type: none"> Low flows and low levels 	<ul style="list-style-type: none"> Means there are no longer swimming holes where they once used to be
<ul style="list-style-type: none"> Poor water quality 	<ul style="list-style-type: none"> Poor clarity as the water is murky and makes it dangerous to swim in due to lack of visibility Chemicals in the water, water is paru

Maniapoto

To Maniapoto, the Waipā River is a single indivisible entity that flows from Pekepeke to its confluence with the Waikato River and includes its waters, banks, bed (including all minerals under it) and its streams, waterways, tributaries, lakes, fisheries, vegetation, floodplains, wetlands, islands, springs, geothermal springs, water column, airspace and substratum as well as its metaphysical elements with its own mauri.

Waiwaia is the spiritual guardian of the Waipā River and the importance of Waiwaia to Maniapoto is boundless. The Waipā River, through Waiwaia, provides for its people the necessary instruments of life. The Waipā River, its tributaries, wetlands and springs are interwoven into the fabric of the Maniapoto people and their identity, tikanga, reo and wellbeing.

(Maniapoto Māori Trust Board, 2014, p. 6)

Within the Maniapoto rohe are seven Regional Management Committees (RMC) that represent the hapū and marae in their respective areas. These are: Hauauru ki Uta, Mokau ki Runga, Nehenehenui, Ngā Tai o Kāwhia, Rereahu, Te Tokanganui a Noho and Tuhua Hikurangi (Maniapoto Māori Trust Board, n.d.).

Maniapoto has a principal obligation for the restoration, maintenance and protection of the quality and integrity of the Waipā River catchment for current and future generations. Key issues identified by Maniapoto as impacting the Waipā River catchment are water quality, erosion and high sediment inputs, loss of habitats and changing shape of the rivers, and declining populations of species (NIWA, 2014).

In detail below Maniapoto have identified key mahinga kai species and highlighted the pressures on declining numbers. Also reported is the importance of being able to safely swim in the rivers.

Mātauranga Maniapoto

Māniapoto consider that they have an inherent obligation to protect land, water and resources as previous generations did before them, and to pass on their mātauranga, traditional practices and values to future generations. For Maniapoto, restoration efforts for the river should be targeted using best scientific information and mātauranga Māori available (Maniapoto Māori Trust Board).

Fisheries

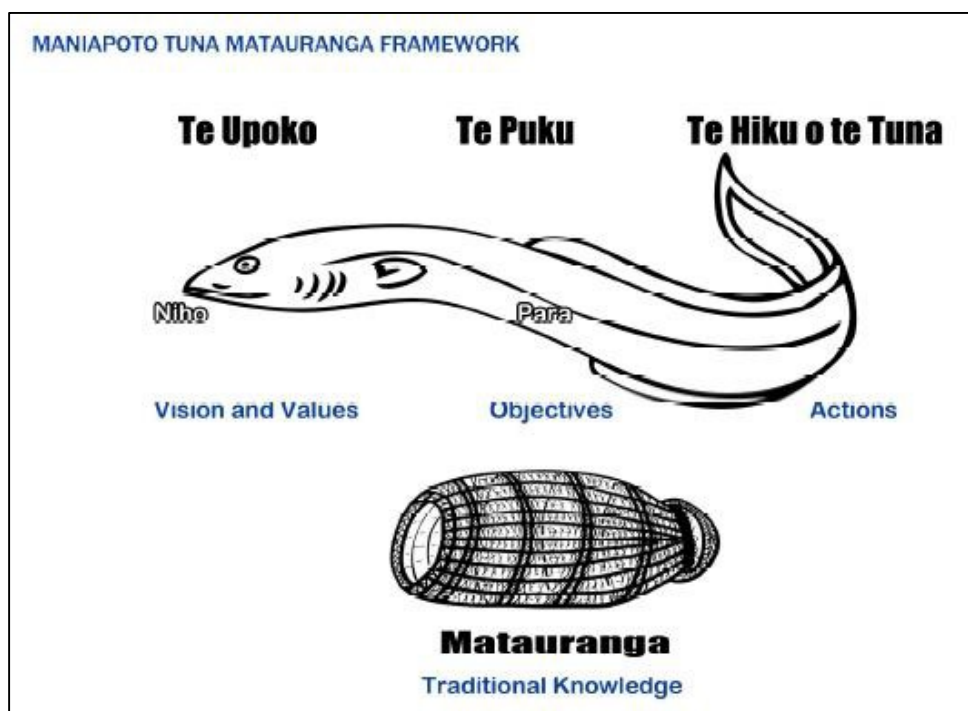
The principles and values that guide the actions and management objectives for fisheries as outlined in the Maniapoto Upper Waipā River Fisheries Plan are (Maniapoto Māori Trust Board, 2014):

- Rangatiratanga
- Kaitiakitanga
- Hononga
- Kotahitanga
- Te Mana Tuku Iho o Waiwaia
- Te Mana o te Wai
- Manaakitanga
- Tikanga
- Kawa

Tuna

A significant taonga and mahinga kai species for Maniapoto is tuna. This is further illustrated with the development of the Maniapoto Tuna mātauranga Framework as the basis for representing different parts of their fisheries plan (see figure 1 below).

Figure 1: Maniapoto Tuna Mātauranga Framework



Source: Maniapoto Māori Trust Board, 2014, p.9

The Hīnaki signifies Mātauranga Maniapoto and science, all knowledge of the fishery (Maniapoto Māori Trust Board, 2014).

Historically, the tūpuna Maniapoto was known to have had a pet tuna and for many generations tuna was a main food source. Given the high regard for tuna there were inter-tribal wars over access to fishing grounds. Such was the case with the traditional tuna resource of the Te Kawa repo (swamp/wetland). Located in the Kakepuku region south west of Te Awamutu tribes battled to secure or protect that access right as the Te Kawa repo was abundant with tuna and “ownership of the repo ensured mana whenua were widely honoured and acclaimed” (Maniapoto Māori Trust Board, 2014, p. 21).

Traditionally, during the migration of tuna downstream, the repo had weirs constructed at its outlets to capture the huge numbers of tuna migrating to sea to spawn. Unfortunately however, the Te Kawa wetland was drained in the early 1910s giving way to pasture and agricultural use. Local iwi strongly objected for a number of reasons including that the: “said drain would infringe the just legal and equitable rights of the objectors to maintain the said piece of land as an eel pa” (Maniapoto Māori Trust Board, 2014, p. 21). The court dismissed the objections stating that plaintiffs could be financially compensated for and they should not stand in the way of draining a large part of the country. This resulted in Maniapoto losing a significant customary eel fishery (Maniapoto Māori Trust Board, 2014).

For Maniapoto customary fishing is for the holistic well-being of the iwi, “the health and well-being of the river encompasses both the fish stocks in the river and the well-being of the iwi” (Maniapoto Māori Trust Board, 2014, p. 23). Low fish stocks mean “less cultural and fishing engagement with the river, resulting in cultural disconnection and a negative impact of tikanga

and knowledge relating to the river not being passed on to younger generations” (Maniapoto Māori Trust Board, 2014, p. 23).

Native fish

Many types of fish are found in the Waipā River, including a variety of native species. The following table lists native freshwater fish and shellfish found in the Waipā River catchment.

Table 11: Native fish species found in Waipā River catchment

Common name (Māori name)	Scientific name
Yellow-eyed mullet (aua)	Aldrichetta forsteri
Short fin eel (tuna)	Anguilla australis
Long fin eel (tuna)	Anguilla dieffenbachii
Australian long fin eel	Anguilla reinhardtii
Lamprey (piharau)	Geotria australis
Torrent fish	Cheimarrichthys fosteri
Giant kokopu	Galaxias argenteus
Koaro	Galaxias brevipinnis
Banded kokopu	Galaxias fasciatus
Inanga	Galaxias maculatus
Short-jawed kokopu	Galaxias postvectis
Black mudfish	Neochanna diversus
Giant bully	Gobiomorphus gobiodes
Common bully	Gobiomorphus cotidianus
Redfin bully	Gobiomorphus huttoni
Cran’s bully	Gobiomorphus basalis
Grey mullet	Mugil cephalus
Common smelt	Retropinna retropinna
Black flounder	Rhombosolea retiaria
Freshwater crayfish (koura)	Paranephrops planifrons
Shrimp	Paratya curvirostris

Source: Maniapoto Māori Trust Board, 2014, p.20.

Unfortunately the numbers of native fish in the Waipā (Waikato River catchment) have declined. The following species are classed as ‘declining’ (Maniapoto Māori Trust Board, 2014):

- Inanga
- shortjaw kōkopu
- giant kōkopu
- kōaro
- longfin eels
- lamprey
- black mudfish
- torrent fish
- redfin bully

Introduced fish species found in Waipā River catchment

Common name	Scientific name
Catfish	Ameiurus nebulosus
Goldfish	Carassius auratus
Grass carp	Ctenopharyngodon idella
Koi carp	Cyprinus carpio
Gambusia or mosquito fish	Gambusia affinis
Rainbow trout	Onchorhynchus mykiss
Perch	Perch Perca fluviatilis
Brown trout	Salmo trutta
Rudd	Scardinius erythrophthalmus
Tench	Tinca tinca

Source: Maniapoto Māori Trust Board, 2014, p.24.

Other kai species

Important kai species for Maniapoto also include watercress, kānga wai (fermented corn), puha and kūtae (mussels) (NIWA, 2014).

Key pressures

Maniapoto have been able to identify a number of pressures on specific species that have impacted quality and abundance as shown in **Table 12**.

Table 12: Key pressures affecting kai species

Kai species	Key pressures
Whitebait	Poor water quality, flood control and loss of habitat
Tuna	Loss of habitat and wetlands, including the disconnection of the river from the surrounding waterways and natural floodplains (flood control), direct and diffuse discharges/pollution (particularly from farming), commercial fishing, and pest plants and fish.
Piharau	Loss of habitat
Kūtae, kāeo or kākahi (freshwater mussels)	Pollution and the decline in water quality, particularly the associated impacts of sedimentation on the habitat of freshwater mussels. Modifications to, or destruction of habitat (e.g., river regulation, eutrophication, sediment type, water quality, water velocity, the degree of sedimentation, and the angle or slope of a lake or river bed).
Kōura	Removal of native forest, loss of habitat, discharges from farming, sedimentation and pest plants.
Watercress	Drainage of swamps and wetlands, water extraction and non-point source discharges (particularly farming).

Source: NIWA, 2014

Swimming

Based on past recollections, the characteristics of a good swimming area (puna kaukau) included being able to clearly see the bottom of the river and a sandy or stony river bed. Currently however, the water is now viewed as dirty, has reduced water clarity and sediment build up (NIWA, 2014). Key pressures on swimming are detailed below.

Table 13: Key pressures affecting safe swimming

Farming practises, pollution, access, gravel extraction
Pest fish, water quality, lack of engagement. Goldfish and algal blooms; carp.
Flood control, deforestation.
Rubbish, pollution, flow, pest fish.
Sedimentation, flood control, access, algae, pest weeds, willows

Source: NIWA, 2014

Waikato-Tainui

Mana whakahaere entails the exercise of rights and responsibilities to ensure that the balance and mauri (life force) of the rohe is maintained. It is based in recognition that if we care for the environment, the environment will continue to sustain the people. In customary terms mana whakahaere is the exercise of control, access to, and management of resources within the Waikato-Tainui rohe in accordance with tikanga. For Waikato-Tainui, mana whakahaere has long been exercised under the mana of the Kiingitanga. Waikato-Tainui managed its resources, including the fisheries and lands, in a sustainable manner, guided by maatauranga, tikanga and kawa.

(Waikato-Tainui 2013, p. 15)

Mātauranga Waikato-Tainui

The Waikato Tainui Environmental Management Plan defines mātauranga as 'knowledge' It also describes how mātauranga Māori is traditional and contemporary Māori knowledge, knowledge systems, and knowledge bases. This includes the body of knowledge originating from Māori ancestors, including the Māori worldview and perspectives, Māori creativity, and cultural and spiritual practices. As an organic and living knowledge base, mātauranga Māori is described as ever growing and expanding.

Fisheries

The exercise of mana whakahaere by Waikato-Tainui is reflected in the 2009 deed through a number of mechanisms, including provision for the development of Waikato-Tainui fisheries regulations.

The Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 gives effect to the 2009 deed and includes the power to develop these regulations.

The Waikato-Tainui Environmental Management Plan describes Waikato-Tainui fisheries as taonga. They are treated as such because they sustain the Waikato-Tainui way of life, both physically and spiritually. In the physical sense, the fisheries provided a cornerstone food source for the tribe. It was plentiful during all seasons of the year, it was reliable, and it was respected. It sustained the tribe during the winter months, and provided energy during battle. The significance of the fishery resource to Waikato-Tainui cannot be underestimated. (p. 185).

Waikato-Tainui fisheries also play a spiritual role as told through many stories and waiata. The taonga species are recognised as the most common form of taniwha (spiritual beings). The roles of taniwha are to heed warnings to the tribe, provide protection and guidance to safety through times of trouble. The taniwha that guided the Tainui Waka to Aotearoa have been described as fish species. The leader, Mawake-nui-o-rangi, has been described as a shoal of fish; the one who beat down the waves was Paneiraira, who was recognised as a freckle headed whale, while the mischief makers were Ihe and Mango-hiku-roa, possibly threshers sharks or dolphins.(p. 185)

Other taniwha described as fish include tuna (eels), wheke (octopus) and koura (freshwater crayfish). Some taniwha are mammals rather than fish and have a closer affinity with humans who are also mammals. This clearly demonstrates the significant influence fisheries have on the wellbeing of Waikato-Tainui (p. 186)

Taonga fish species of the Waikato-Tainui rohe include, but are not limited to, tuna (Shortfinned and Longfinned eel), whitebait species (iinanga, kooaro, banded kookopu, giant kookopu, and shortjaw kookopu), smelt, piiharau (lamprey eels), kanae (mullet – yellow-eyed and grey), paatiki (flounder – yellow-bellied), kahawai, trevally and tamure (snapper). Taonga shellfish and koura include: koura, kaaeo, kaakahi (freshwater mussels), tio (oyster), pipi, kina and kuutai (green-lipped mussel). (p. 186)(NIWA,2010,e,f)

For Waikato-Tainui the restoration of taonga fish and shellfish species and the ability to provide these taonga as food in reasonable amounts to manuwhiri (visitors) is a critical marker of the tribe's mana and status. It also confirms a tribe's proficiency in manaaki taangata or the practice of generosity and reciprocity. The abundance of food and other resources that were traditionally available to Waikato-Tainui within its tribal rohe (boundaries) are well known by other tribes throughout the motu (country). (p. 186)

Mana whakahaere over fisheries

The mana whakahaere of Waikato-Tainui over fisheries is reflected through:

- (a) Exercising customary fishing rights to taonga species;
- (b) Access to, and use of, traditional and existing fisheries sites;
- (c) Decision making in the management of fisheries and significant sites;
- (d) Making decisions in the management of factors that contribute to the wellbeing of taonga species and significant sites;
- (e) Waikato-Tainui involvement in issuing special permits.
- (f) The existence of documents of agreement between mana moana and mana awa tribes and other parties (e.g. Customary Fisheries Management Plans, Memoranda of Understanding, Gazette Notices, relationship agreements, and future treaty settlements in the marine environment and other freshwater catchments; and
- (g) The use and management of fisheries through customary practices from Waikato-Tainui tikanga and kawa. (Waikato Tainui, 2013)

Swimming

Waikato-Tainui aspires to have waters that are drinkable, swimmable, and fishable with the water quality at least at the level it was when Kiingi Taawhiao composed his maimai aroha. The ability to have drinkable and fishable water is limited by a number of factors such as the concentrations of E. coli, eutrophication, suspended sediments, arsenic and mercury (Waikato-Tainui, 2013, p.152.).

Summary of mahinga kai species and key pressures

This chapter outlines the common mahinga kai species (predominantly fish species) living in the Waikato and Waipa rivers as well as some of the pressures impacting species.

Common species

Located within the Waikato and Waipa rivers are 19 native fish species as well as freshwater mussels, crayfish and shrimp as shown in the table below:

Table 14: Native fish species found in the Waikato and Waipā River catchments

Common name	Scientific name
Yellow-eyed mullet (aua)	<i>Aldrichetta forsteri</i>
Short fin eel (tuna)	<i>Anguilla australis</i>
Long fin eel (tuna)	<i>Anguilla dieffenbachii</i>
Australian long fin eel	<i>Anguilla reinhardtii</i>
Lamprey (piharau)	<i>Geotria australis</i>
Torrent fish	<i>Cheimarrichthys fosteri</i>
Giant kokopu	<i>Galaxias argenteus</i>
Koaro	<i>Galaxias brevipinnis</i>
Banded kokopu	<i>Galaxias fasciatus</i>
Inanga	<i>Galaxias maculatus</i>
Short-jawed kokopu	<i>Galaxias postvectis</i>
Black mudfish	<i>Neochanna diversus</i>
Giant bully	<i>Gobiomorphus gobiodes</i>
Common bully	<i>Gobiomorphus cotidianus</i>
Redfin bully	<i>Gobiomorphus huttoni</i>
Cran's bully	<i>Gobiomorphus basalis</i>
Grey mullet	<i>Mugil cephalus</i>
Common smelt	<i>Retropinna retropinna</i>
Black flounder (pātiki)	<i>Rhombosolea retiaria</i>
Freshwater crayfish (koura)	<i>Paranephrops planifrons</i>
Shrimp	<i>Paratya curvirostris</i>

Source: *Maniapoto Māori Trust Board, 2014, p.20.*

NZ Landcare Trust, 2014, p 14.

Key pressures

Key pressures impacting on native fish identified by the NZ Landcare Trust (2014) are provided in the following table:

Table 15: Key pressures on native fish

Key pressures identified	Comments
<ul style="list-style-type: none"> Introduced fish 	<ul style="list-style-type: none"> Trout for example eat eggs and young native fish, or take their food
<ul style="list-style-type: none"> Pest fish 	<ul style="list-style-type: none"> Brown bullhead catfish found throughout the Waikato river catchment eat native fish and invertebrates Koi carp uproot water plants, eat insects, stir up mud and eat young native fish Gambusia (mosquito fish) which live in shallow wetlands, streams and ponds attack native fish such as whitebait and mudfish and eat their eggs Wild goldfish eat plants and insects and encourage blue-green algae
<ul style="list-style-type: none"> Pest plants 	<ul style="list-style-type: none"> Alligator weed and yellow flag iris in the lower Waikato replace whitebait spawning habitat Willow replace native plants and block waterways
<ul style="list-style-type: none"> Commercial and recreational fishing 	<ul style="list-style-type: none"> Some whitebait species and longfin eels are becoming scarce due to over fishing
<ul style="list-style-type: none"> Dams and culverts 	<ul style="list-style-type: none"> Challenging for migrating fish to pass such as tuna and whitebait
<ul style="list-style-type: none"> Loss of habitat 	<ul style="list-style-type: none"> Includes reduced wetlands, river and stream straightening, water takes, loss of stream vegetation
<ul style="list-style-type: none"> Water pollution 	<ul style="list-style-type: none"> Caused by nutrients, pesticides, sediments, chemicals

As part of the Waikato River Independent Scoping Study (WRISS) (NIWA, 2010) with Tuwharetoa, Te Arawa River Iwi Trust, Raukawa, and Waikato-Tainui a summary of the mātauranga of mahinga kai species was provided. The table below shows alongside mahinga kai species the key pressures impacting each.

Table 16: Summary of mahinga kai species and pressures from the WRISS study

Mahinga kai species	Summary of state	Key pressures identified
Eel (tuna)	<ul style="list-style-type: none"> Important part of the traditional Māori diet Highest priority species identified for restoration Used to be in plentiful supply, however tuna stocks have declined significantly 	<ul style="list-style-type: none"> Hydrodams Disconnection of the Awa from the surrounding waterways Discharges Commercial fishing Koi carp
Whitebait (includes inanga, kokopu, and koaro)	<ul style="list-style-type: none"> Important kai species for River Iwi especially in the Lower Waikato Used to be plentiful but populations are declining 	<ul style="list-style-type: none"> Decreased water clarity Competition with commercial and recreational fishers forcing whānau out of traditional whānau based areas Point and non-point source discharges including farming, sewage, industry Reduction of habitat and spawning sites Koi carp Pest plants Reduced wetlands Forestry
Lamprey (piharau)	<ul style="list-style-type: none"> Important kai species Piharau fishery has significantly declined over the last 50 years Used to be seasonal sites for catching piharau at 	<ul style="list-style-type: none"> Hydrodams and associated habitat and loss Pollution Pest plants Koi carp Reduced wetlands

Mahinga kai species	Summary of state	Key pressures identified
	Turangawaewae and below the Karapiro dam	
Porohe	<ul style="list-style-type: none"> • Mentioned as being caught in the Lower Waikato at Turangawaewae and Lakes Whangape and Waikare. • Have not been able to source 	<ul style="list-style-type: none"> • Poor water quality
Black flounder (pātiki)	<ul style="list-style-type: none"> • Most commonly harvested by Waikato-Tainui • Used to be collected as far as the lower Waikato lakes • Numbers have declined 	<ul style="list-style-type: none"> • Poor water quality • Disconnection of the awa from the surrounding waterways • Koi carp
Mullet (kanae)	<ul style="list-style-type: none"> • Most commonly harvested by Waikato-Tainui • Used to be caught all along the awa up to Karapiro dam as well as lower Waikato lakes 	<ul style="list-style-type: none"> • Commercial fishing • Disconnection of the awa from the surrounding waterways • Koi carp • Pest plants • Pollution • Poor water quality
Freshwater mussels (kaeo, kakahi)	<ul style="list-style-type: none"> • Used to be plentiful all along the Waikato River catchment and considered an important mahinga kai species • Have over time observed a decline in numbers and not as healthy 	<ul style="list-style-type: none"> • Poor water quality • Hydrodams slowing water flows and pest weeds growing in hydro lakes negatively impacting habitat of freshwater mussels • Reduced wetlands
Freshwater crayfish (koura)	<ul style="list-style-type: none"> • Was available to all Waikato River Iwi throughout the catchment, including the mainstem, lower Waikato lakes, hydro lakes and springs and tributaries along the river • Populations are declining and rare in some parts of the catchment • Presence of koura considered to be a good indicator of waterway health 	<ul style="list-style-type: none"> • Removal of native forest • Impacts of non-point source discharges such as farming • Natural geothermal characteristics of the upper catchment • Catfish in Lake Taupo
Watercress	<ul style="list-style-type: none"> • Was plentiful throughout the Waikato River catchment and formed an important part of the staple diet of River Iwi • Is no longer abundant and becoming more difficult to find 	<ul style="list-style-type: none"> • Operating regimes of hydrodams • Point source and non-point source discharges • Pest weeds • Farming practices eg. Sprays • Reduced wetlands • Pollution • Access due to private land ownership and weed growth eg. blackberry

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