



BRIDGING INDIGENOUS AND ENVIRONMENTAL SCIENCE: THE ROLE OF MĀTAURANGA MĀORI IN ENVIRONMENTAL MONITORING

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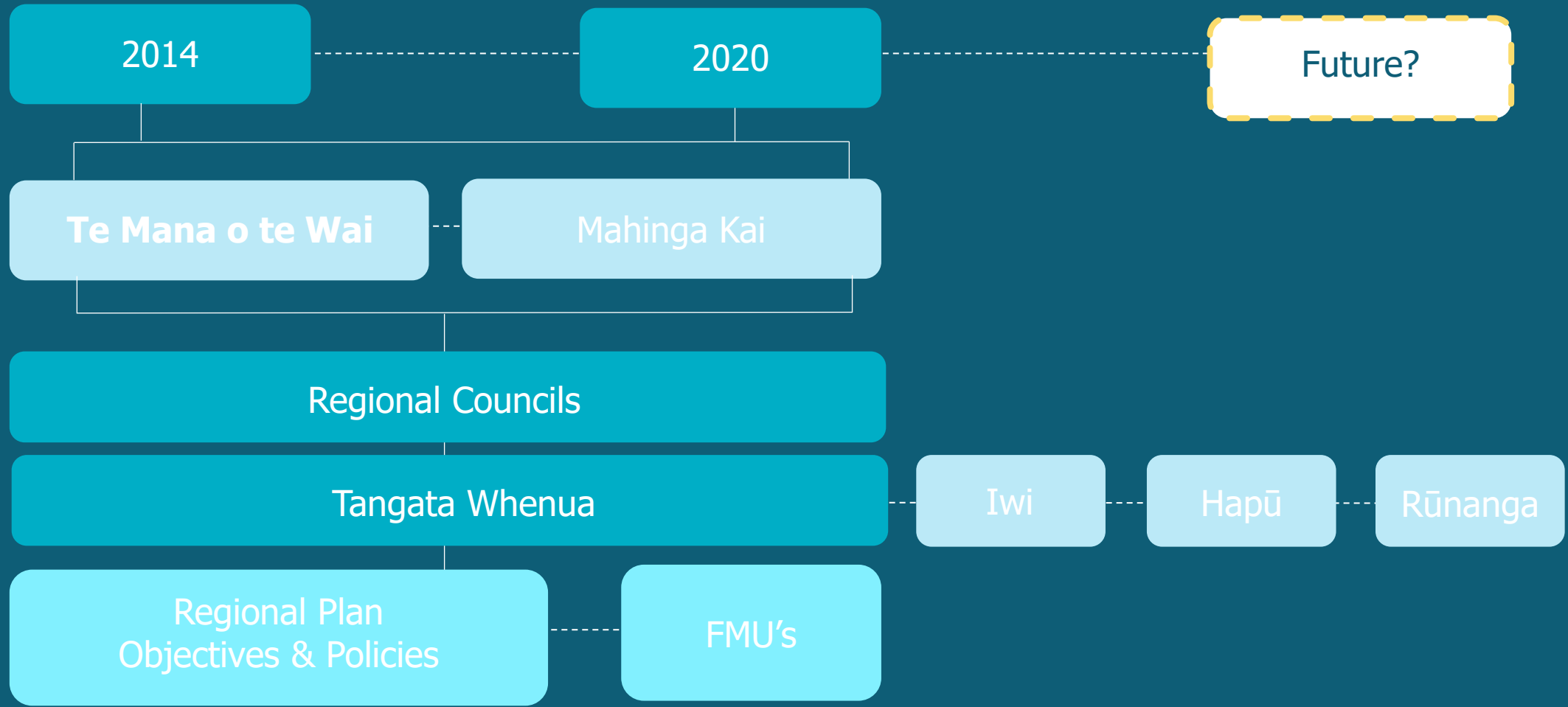


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NATIONAL POLICY STATEMENT – FRESHWATER MANAGEMENT



How do we monitor the successful implementation of these objectives and policies that acknowledges a Te Ao Māori worldview?



TE AO
MĀORI

WESTERN
SCIENCE

Collective,
Collaborative,
Balanced
Approach

“Mō tātou, ā, mō ngā uri ā muri ake nei.
For us, and the generations to come.”



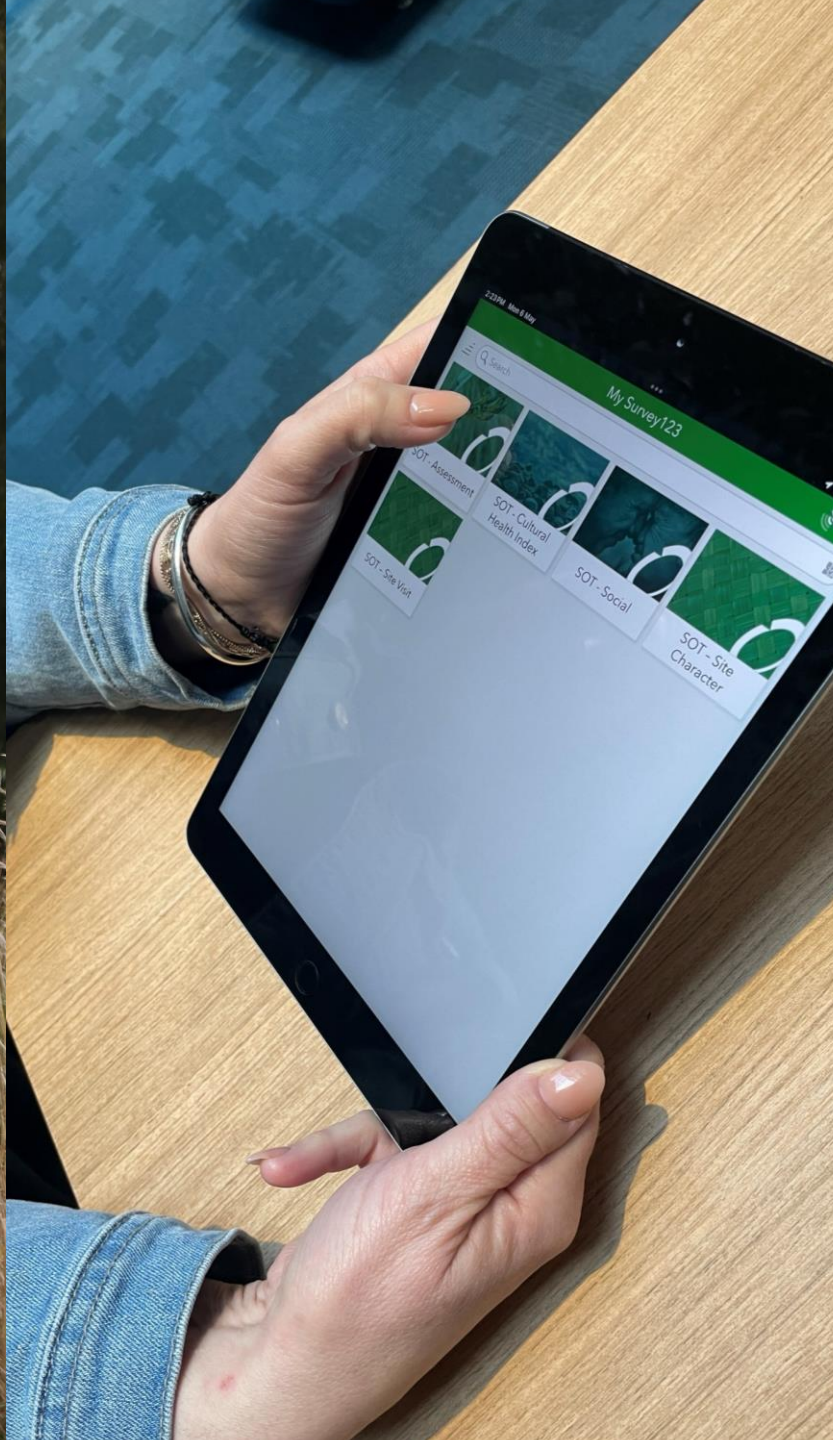
WATER
QUALITY

RE-CONSTRUCTED
WETLAND

MAHINGA
KAI

DRAINAGE &
FLOODING

STATE OF THE TAKIWĀ + CULTURAL HEALTH INDEX





FRESHWATER FAUNA



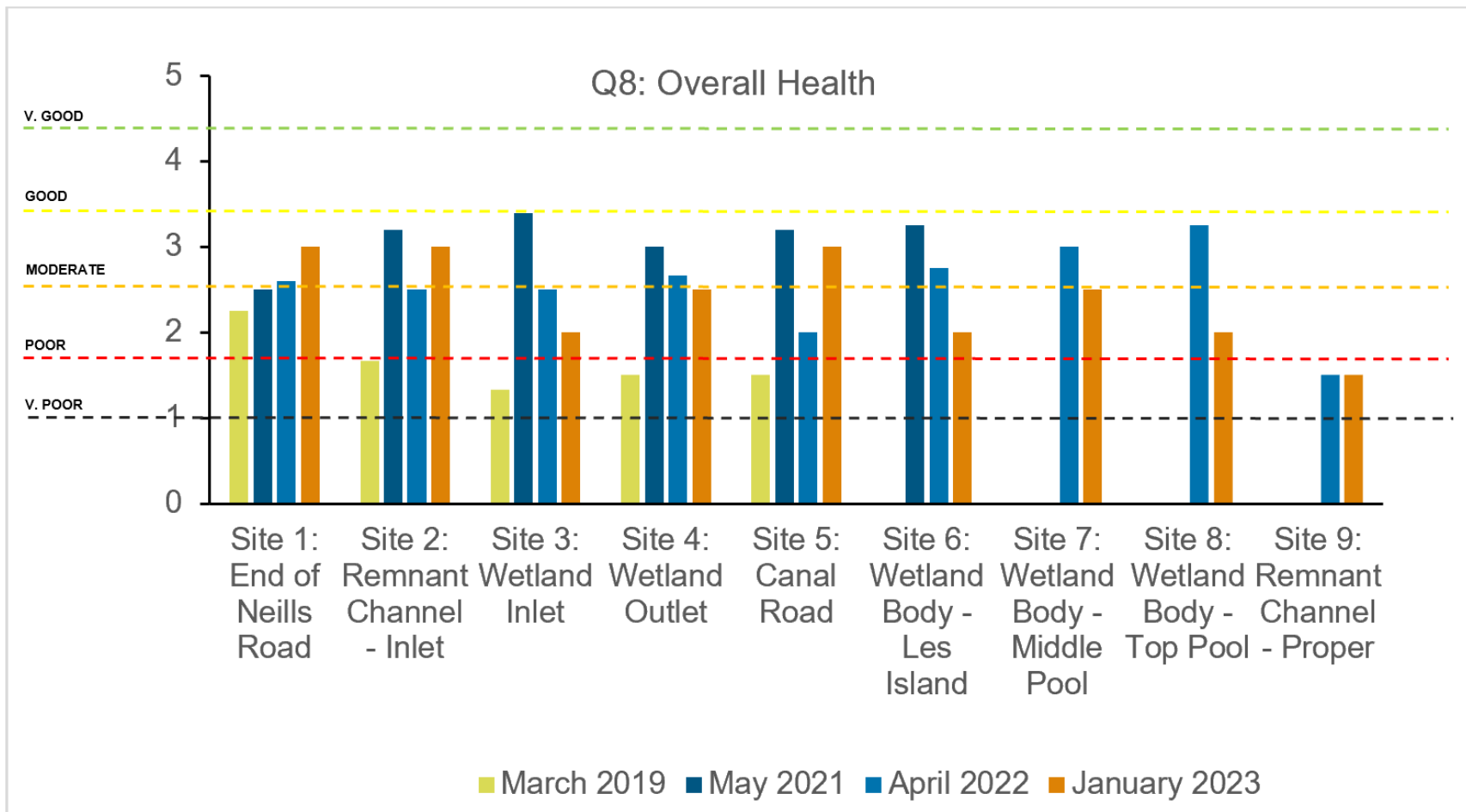
VEGETATION



MACROINVERTEBRATE



HABITAT & WQ



RESULTS

IDENTIFY AND TRIAL MĀTAURANGA MĀORI BASED
METHODS FOR MONITORING INDICATOR SPECIES
OF SIGNIFICANCE TO MANA WHENUA.

**DOES IT ALIGN, DIFFER OR CONTRADICT
WESTERN SCIENCE?**

LITERATURE REVIEW & DESKTOP REVIEW

Name of Tool	Brief Description	Science?	Habitat Type	Have I/we done this before?	Could we do this?	External Example
Cultural Health Index	Records observations specific to the cultural and biological health of running waterways. Stream Health Monitoring Assessment Kit (SHMAK) has provided land owners, iwi, school and community groups with a simple, scientifically sound resource to monitor the ecological health of New Zealand's streams.	M	F	Y	Y	Changes required to our existing form, see review above. If we introduced stone method, mandarin method and make some amendments to our current CH index, we wouldn't need to.
SHMAK		M & W	F	N	Y	SHMAK does not cover all indicators the SHMAK does. Some minor changes could happen to our reporting style and with the addition of water sampling, we would cover all indicators.
Stone Method for Periphyton	Examine 10-20 stones from stream bed and examine presence and % of periphyton. Time how long a mandarin floats across a section of waterway. Reported as distance per unit time e.g. metres per second.	W	F	Informally	Y	Nothing needed, continue to offer as part of our suite.
Mandarin Method	Examine 10-20 stones from stream bed and examine presence and % of periphyton. Time how long a mandarin floats across a section of waterway. Reported as distance per unit time e.g. metres per second.	W	F	Only as part of FRAT.	Y	Nothing needed, continue to offer as part of our suite.
Māori Compass	A mātauranga Māori tool for assessing the health of waterways. Cultural monitoring framework developed to monitor, record and assess the cultural health and environmental state of the marine environment.	M	F or M	N	N	Didn't progress this further as agreed to keep scope to freshwater.
Tangaroa Tohu Mana, Tangaroa Tohu Māori	Take spot measures of dissolved oxygen, temperature, pH and conductivity using a handheld YSI water quality meter.	M	M	N	N	Nothing needed, continue to offer as part of our suite.
Water Quality Meter	Digitalised form to record observations and assessments of mana whenua representatives for a particular site, at a particular time. The form includes general visit and site details, indicators of site significance and an overall 'state of the environment' assessment.	W	F - maybe M?	Y	Y	Nothing needed, continue to offer as part of our suite.
State of the Takahā	Add a social research dimension to the State of the Takahā assessment - needs to be undertaken in conjunction.	M	F or T	Y	Y	Nothing needed, continue to offer as part of our suite.
Haurua I Te Tangaroa	Water Sample MCQ	M/W?	Any	Second hand through Project Takahāki	Y	The form we generated for Project Takahāki is a generic form specific to would need reworking to be more broad. Combine with the visit form.
Water Sample MCQ	Leads, nitrogen, phosphorus? Turbidity?	W	F	Y	Y	
Fish Passage Assessment Tool		W	F	Y	Y	
Report Cards						
Fish Surveys						
Vegetation Monitoring						
Habitat Survey						

Indicator	Currently Measure?	General Notes
Temperature		Water temperature can cause issues for many species. Can be measured using WQAM
Riparian condition		Covered by 'Vegetation - Banks & Margins (100m) either side' in current form
Occurrence of native fish		Could be seen addition by adding a question: "Do native fish occur here?" This is repetitive if completing an SOF concurrently
Cherry		After fish feeding and plant growth, indicator of sediment traps and deposition
Disturbed oxygen		Important as many species can not tolerate low dissolved oxygen. Can be measured using WQAM
Algae		Could be the process to taking a water sample?
Periphyton		If we added the stone method, this would measure this indicator
Macrobenthic invertebrates		We cover this as a separate tool so don't think it best at incorporating this into our tool
Place names		Potentially more contemporary than traditional?
Streambank cover		Added to CH - have an assessment score?
Composition of water		Covered by 'Water Quality (a) a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z' in current form
Presence of effluent water		Added to the description of 'A nearby habitat'
Sound of wind in riparian veg		
Sound of birds present		Add a drop-down list of sounds that could be selected? E.g. wind in riparian veg, bird song, waterfall etc.
Sound of current waterway		
Sound of forest floor		
Flow in case visible		Covered by 'Water Quality (a) a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z' in current form
Flow		How this would be covered by 'unpleasant odour' - are we taking smells from the environment that isn't water based? E.g. Farming
Presence or absence of activities in the headwaters		Very specific
Sediment control on the watershed		Already mentioned
Continuity of vegetation		Is this about riparian planting density?
Unnatural grasses		Is this about edge biomass? Haven't based the need for this yet and could be captured in the 'comments' section
Fleas, oils and other human pollution		Covered by 'Water Quality (a) a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z' in current form
Flood lines		Flowing might be affected to show where it's impacted and you know it's higher than normal?
Willow infestation		Added to our CH - have seen this be a critical issue for mana whenua in a stream? Are there willow present on the edge of the waterway? addition would be useful
Abundance and diversity of banks		Repetitive to include in CHP - see other indicators where CH would be more without SOF?
Presence or absence of sticks in riparian margins and/or waterway		Covered by 'Cattails and low' but description could be amended
Changes to the river mouth		Very site specific
Unnatural sedimentation in channels		Covered by 'Disturbed conditions (sediment)
Loss of aquatic vegetation in the marine environment		Relevant if assessing marine environments but we aren't very developed yet
The health of fish habitat in the waterway		If occurrence of fish - add this then this might be an important indicator but again, repetitive if completing an SOF concurrently
Changes to the extent of the tidal influence		Relevant if assessing marine environments but we aren't very developed yet
What you see looking?		
What you smell looking?		Add to our CH - Use a measurement of completely usable (1) to completely safe (5)
What you drink the water?		
What you use the water for?		
Do you see the necessary food sources to support the life in and around the river?		
What characteristics of this site should be enhanced/protected?		Unsure if this belongs in an updated CH or does it form part of a 'social form' or in the SOF?
Are there anything about this site that limits or stops you enjoying this site?		
Have you visited this site before?		
Channel width		Covered by 'Changes to the river channel'
Shore and discharge		Could be added to a sample 'to have an evidence of trees and/or discharge'
River channel modification		Covered by 'Changes to the river channel'
Use of riparian vegetation		Indicators of local contribution of water to humans or stock
Use of riparian vegetation		Covered by 'Changes to the river channel'
Turbidity		Closely linked with water clarity, reflects plant growth, fish feeding and sedimentation. Can be measured using WQAM
pH		Affects plants and fish. Can be measured using WQAM

- Nga tohu o te taiao: Observing signs of the natural world to identify seagull over-abundance as a detriment to shellfish survival in Ohaiwa Harbour, Aotearoa/New Zealand (saanz.net)

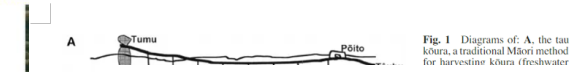


Fig. 1 Diagrams of: A, the tau koura, a traditional Māori method for harvesting kūra (freshwater)

Table 1: Indicators of stream and river health as identified by kaumātua and MFE

Indicators identified by kaumātua only	Indicators identified by both	Indicators identified by MFE
Place names		
Unpleasant		
Greenness		
Presence of		
Sound of w		
Sound of bi		
Sound of o		
Sound of fi		
Flow in the		
Small (B)		
Presence of headwater		
Sediment o		
Continuity o		
Unnatural f		
Fleas, ois		
Flood lines		
Willow sites		
Abundance		
Presence of water		
Changes to Unnatural f		
Loss of rip environment		
The health		
The stomp		

Figure 1: E

Background marine i "To have prevent traditior reaching the tāu attaches surface: roots fr approx owing to fern (C) tau but: whānau submerg bottom to avoid

"We rec 30 m de along th

Retrieved from E "The taura kuku: stations annually expert weaver us leaves) from trac and other natura (Ereoxystia bank) Supply jack) and

- Kuku/KC
- S
- N

Essential Fresh

- A part of

- The signi from rún system't
- Develop outlined-

TO LOOK UP:

- Tūa whenua world view.
- Te kura o te hūwera - documentary looking at the kereru - important to centralising and localised, indigenous, ontological perspective.

Search Terms:

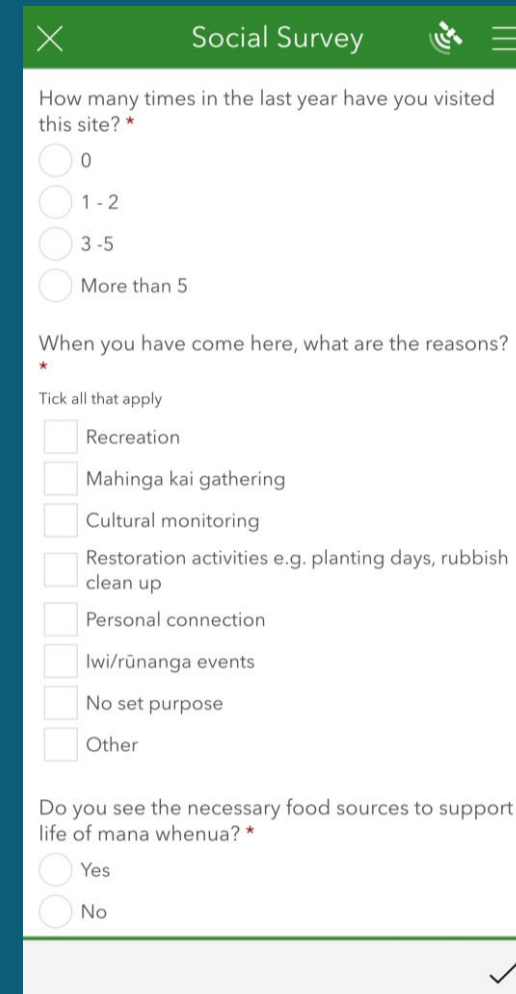
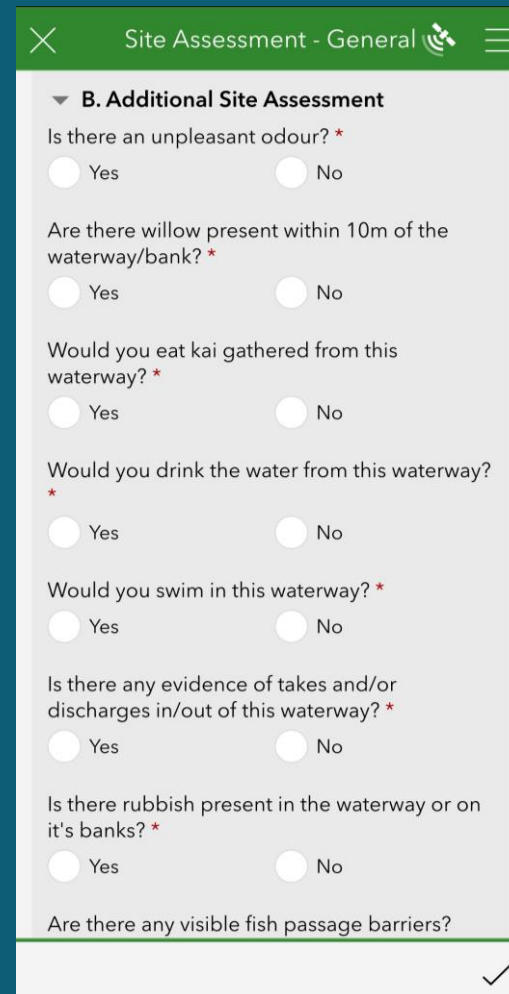
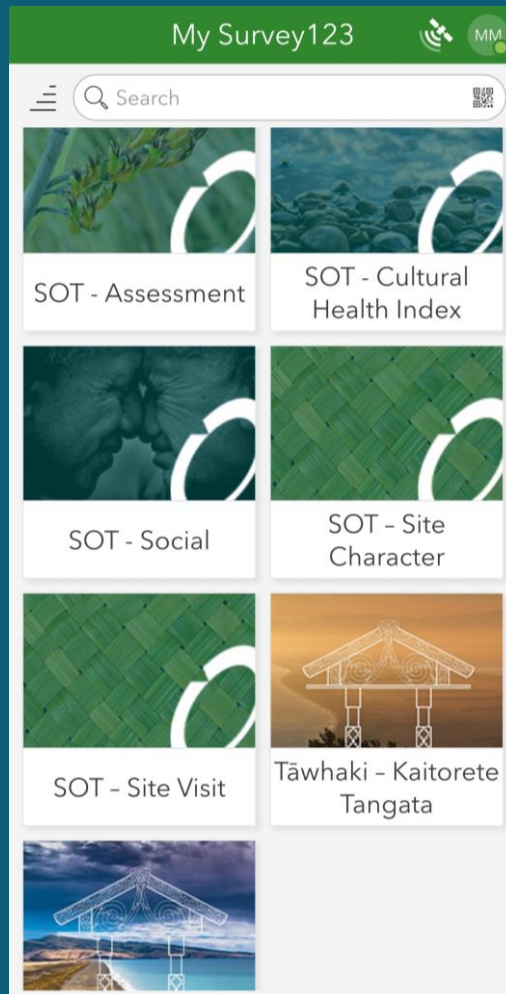
- Mātauranga Māori environmental monitoring.
- Mātauranga Māori monitoring methods.
- Freshwater Mussels and Māori monitoring.
- Mātauranga Māori practice.

Research Questions:

- Is our current methodology reflective of current expectations, issues, threats and aspirations that manuhewa are facing in regard to our freshwater environments?
 - Current methodology:
 - State of the Takihā
 - Cultural Health Index
 - Macroinvertebrate Community Index
 - Fish surveys using hīpaka and GMT's
- Are we being as innovative as possible with our methodology?
- Is innovation in fact contradictory to mātauranga Māori and should we be offering more traditional methods? If so, what traditional methods should be used in parallel with western science?

Working Notes

- Contextualise and localise.
- Explore kaiakitanga and how this can empower manuhewa.
- Lots of debate about the applicability of the concept - consider how localised environmental management is done. Own management is done - not defined through kaiakitanga.
- 3393.pdf (newzealandecology.org)
- Intergenerational observations and ecological understandings of species' interactions and patterns of use have been accumulated and are grounded in the existence of Māori which are intimately bound to residing in one place for many generations -> Nga tohu o te taiao: Observing signs of the natural world to identify seagull over-abundance as a detriment to shellfish survival in Ohaiwa Harbour, Aotearoa/New Zealand (saanz.net)
- Ecology and Society: A review of Indigenous knowledge and participation in environmental monitoring
- Full article: Mātauranga Māori: shaping marine and freshwater futures (tandfonline.com)
 - Kaipara Harbour mātauranga māori management plan.
 - Murihiku cultural water classification system.



INTERFACE UPGRADES

FLEXIBILITY



Ngāti Tara Tokanui
Ōhinemuri River

Ngāi Tahu Papatipu Rūnanga
Huritini River / Ahuriri Lagoon
Ararira / LII River
Waikirikiri/Selwyn River at Coes
Ford
Kaitorete Spit

Te Rūnanga o Arowhenua
Hinds River

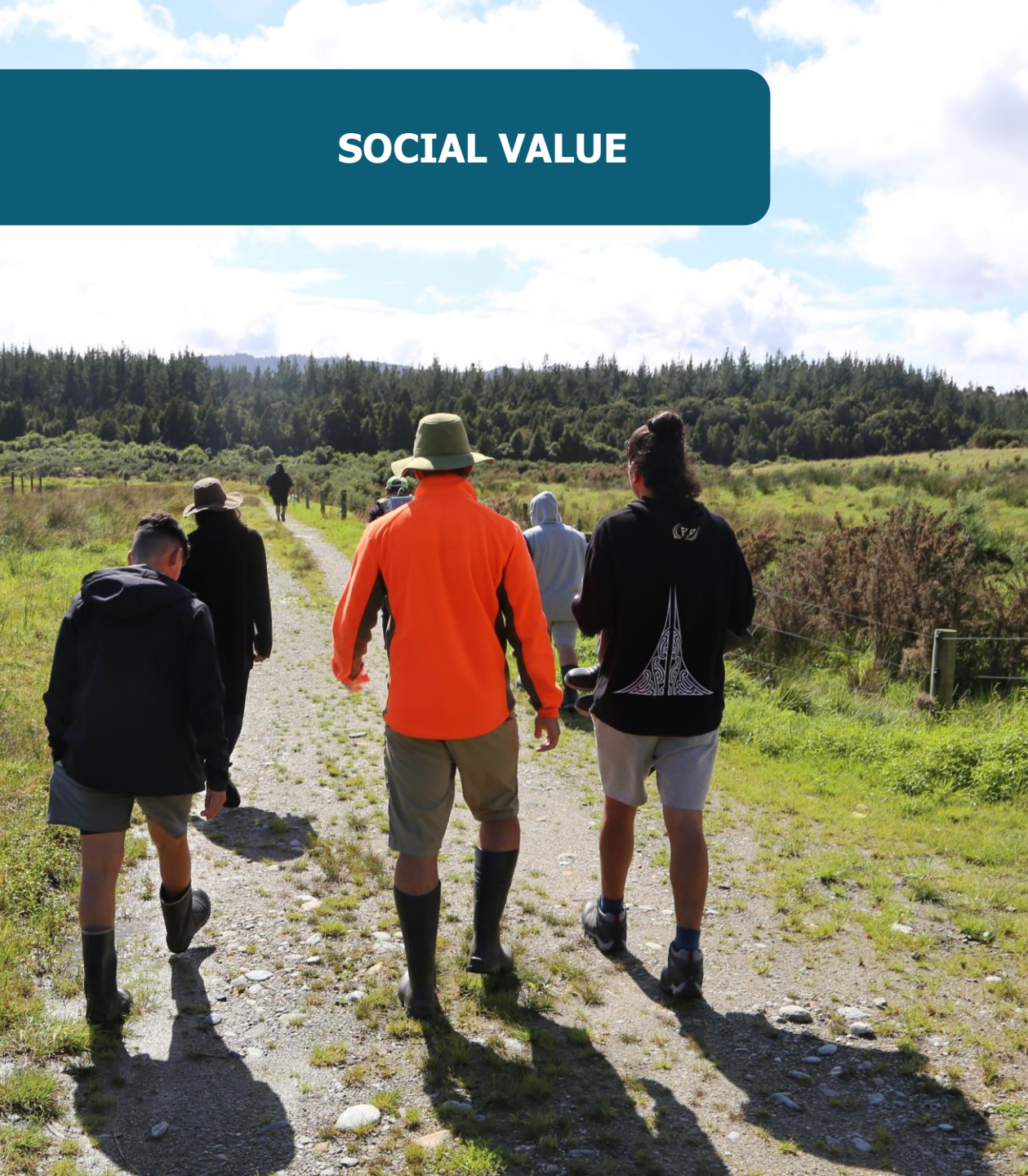
Ngāti Waewae
Arahura River

COLLABORATION

DIGITISED METHODOLOGY



SOCIAL VALUE



RELATIONSHIPS



A scenic landscape featuring a calm lake in the foreground, surrounded by rocky shores and sparse vegetation. In the background, there are rugged mountains with patches of snow under a clear blue sky. Overlaid on the center of the image is a Venn diagram consisting of three overlapping teal circles. The top circle contains the word 'INNOVATION', the bottom-left circle contains 'COLLABORATION', and the bottom-right circle contains 'INDIGENOUS KNOWLEDGE SYSTEMS'. The central area where all three circles overlap contains the text 'SYNERGETIC APPROACH'.

INNOVATION

**SYNERGETIC
APPROACH**

COLLABORATION

**INDIGENOUS
KNOWLEDGE
SYSTEMS**

Ngā Mihi! Thank you!
Patai? Questions?