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NGĀ MATAPOPORE WHENUA

Assessing Stream Health

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Why it is important to monitor streams?

Monitoring options

Stream Health Checklist

Macro-Invertebrates and what they can tell us

An example of eDNA

Why do we need to think about freshwater?

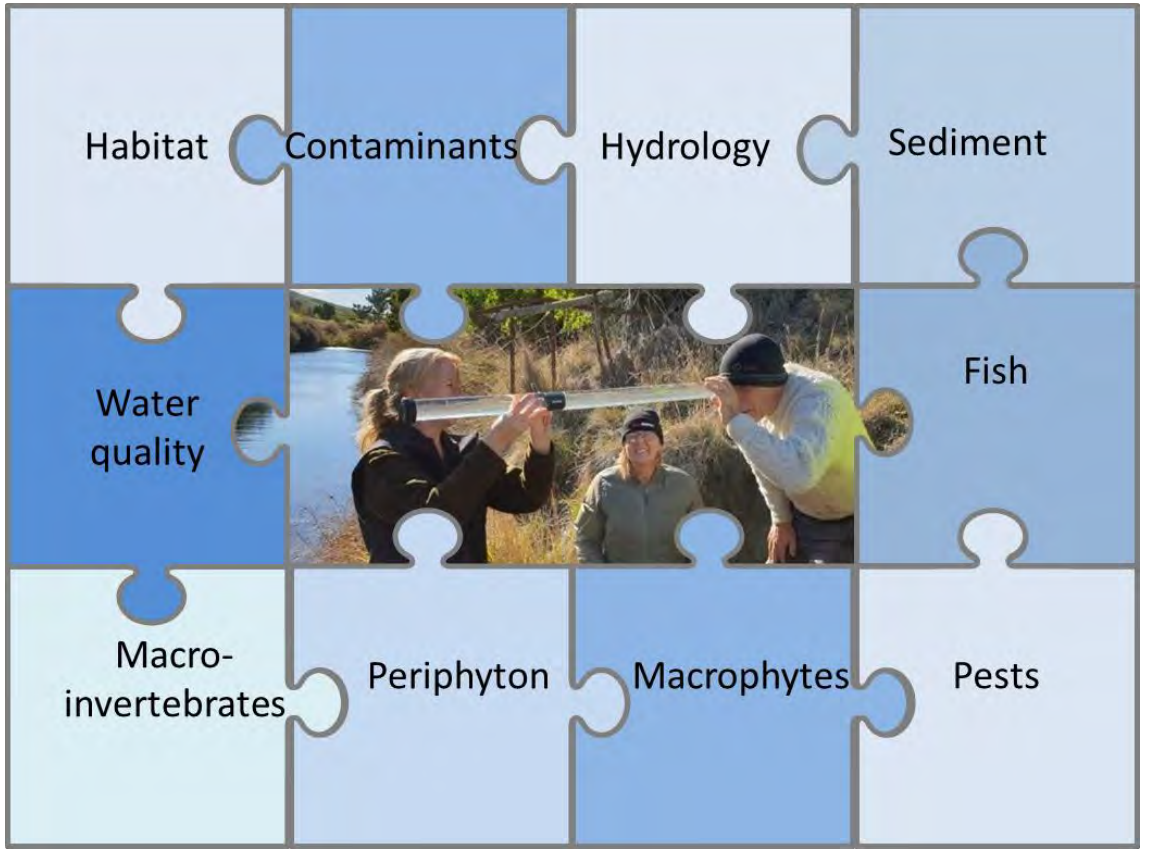
- Our rivers and streams have intrinsic natural values and often support unique flora and fauna
- We rely on clean water for stock and human health and to grow pastures and crops
- Our actions as land managers influence freshwater ecosystems, economies and communities in our catchment
- Regulations are changing – a catchment wide approach is needed

Why monitor?

Understanding your stream health means you can identify impacts and then take appropriate actions

Understanding ecosystem health

- Freshwater health
  - ✓ Chemical
  - ✓ Biological
  - ✓ Physical



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beef+lamb new zealand

Know your stream's health
Stream Health Checklist

Stream monitoring

- One-off – one point in time
- Ongoing – monitoring trends over time
- Same time of year
- Same location – take photo points
- Accessible & safe
- Representative of property or a particular impact eg stockyards or planting area
- > two weeks after flooding

Stream Health Check

FW2

Stream Name: _____

Date and Time: _____

Notes on recent climatic conditions:

Notes on recent land use around waterway:

This assessment form is designed for landowners to assess critical aspects of their waterway as an indication of its current level of ecological health. The overall final score ranges from 500 to 50. A score greater than 250 indicates a good stream while a score of less than 120 indicates there are aspects of your waterway that might be contributing to its low health.

⚠ **Related waterway health risk**

(see **Table 2.1 Risk factors and drivers**) in Freshwater ecosystem health

Stream banks					
What percentage of the stream is shaded by plants and stream banks?	50% or more	30%	10%	Little or no shading.	B, F, I
	16	8	4	2 ✓	
How stable are the stream banks?	Banks stable, rock and soil firmly held by grasses, shrubs and tree roots.	Banks firm but loosely held by grass and shrubs.	Banks of loose soil held by a patchy layer of grass and shrubs.	Banks unstable, of loose soil or sand easily disturbed.	A, D, E
	16	8 ✓	4	2	
What is the level of erosion on surrounding landscape and on the stream banks?	No evidence of erosion in surrounding landscape, no scarring on stream banks and no undercutting.	Some erosion in surrounding landscape, occasional scarring on stream banks and undercutting.	Moderate erosion in surrounding landscape. Eroding banks slowly widening.	Significant erosion in surrounding landscape, significant areas of stream bank cut away, some loss of farmland.	
	32	16	8	4	

Ideal stream habitat

- Cold shaded water
- A variety of pools, runs, riffles and rapids
- Rocky/hard bottom
- Stable banks
- Woody debris

Freshwater impacts

- Sediment – bank erosion or run-off
- Overland flow and leaching of surplus nutrients
- Lack of riparian vegetation
- Lack of effective wetlands as filters
- Temperature spikes/ lack of shade
- Bank alteration e.g straightening
- Infrastructure e.g culverts, fords
- Faecal bacteria e.g e-coli

Stream Health score

	32	16	8 ✓	4	A, D, E
How cohesive are the soils of the stream bank?	Very cohesive. Mostly rock and cemented material (boulders and bedrock).	Moderately cohesive. Tightly packed gravel or sand in a clay matrix.	Loose soils with fine aggregates. Tightly packed sands or gravel with some silt or clay.	Very loose soils. Loosely packed sand, gravel or pumice material.	
	16	8 ✓	4	2	
How well do your soils drain after rain?	Deep, well-drained soils that slow down the flow of water to waterways and drains.	Moderately well-drained soils, with some waterlogging for periods in winter where runoff poses a risk to waterway.	Excessively well-drained soils where water moves freely and rapidly through the soil into underground aquifer likely connected to waterway.	Poorly drained soils where water-logging and surface-ponding occurs where runoff a risk to waterway.	
	16	8	4	2 ✓	
TOTAL *(add up each of your scores to generate a total)*			135		

As part of your Stream Health Check you will have identified areas to help improve your scores and where risks may be greater. The final column in the Stream Health Check links to the 'Risk factors and drivers' table in Step 14. Combining the results from your assessment, identifying specific risk areas, and working through the risk matrix you will complete in Step 14, will help you identify appropriate actions to enhance freshwater ecosystem health on your farm addressing the areas of greatest risk first.

What does my total score mean?

- **More than 250:** Great! Your stream is very healthy and hence has low priority for waterway management. It provides important fish and wildlife habitat and clean water for downstream users.
- **120 – 250:** Your stream has lots of potential and is at in an intermediate level of health. But there are clearly some aspects of your waterway that need attention. The final column in the form links with a list of ecosystem attributes and farm activities that may be impacting on these. By finding questions where you answered 2 or 4 you can find on-farm risks that may need attention in your farm management or planning.
- **Less than 120:** Your stream has been adversely affected by activities on your farm or upstream in the catchment. Again, by finding questions where you answered 2 or 4 you can identify on-farm risks that may need attention in your farm management or planning.

Potential for contaminants					
Is there any artificial drainage entering the stream? *(e.g. tile, mole, storm water, and/or open drains which are regularly cleared of vegetation)*	No artificial drainage.	Sparse artificial drainage.	Moderate amount of drainage.	Extensive drainage networks.	B, C, D, E
	32	16	8	4	
Are there any Critical Source Areas (CSA's) or overland flow pathways where runoff enters the stream? *(e.g. gullies, depressions, swales on adjoining land)*	No CSA's or overland flow pathways within 100m.	One CSA or overland flow pathway within 100m.	2-3 CSA's or overland flow pathways within 100m.	Greater than 3 CSA's or overland flow pathways within 100m.	A, B, C, D, E
	16	8	4	2 ✓	
How much nitrogen and phosphorus fertiliser is used by yourself and/or neighbours?	None	Less than 150kg/ha super or equivalent, no nitrogen fertiliser.	150-300kg/ha super or equivalent, less than 50kgN/ha.	More than 300kg super or equivalent, greater than 50kgN/ha.	A, B, C, D
	32	16	8	4	

Related waterway health risk
(see **Table 2.1 Risk factors and drivers**) in Freshwater ecosystem health

How deeply incised are the stream banks?	Top of stream banks 10m or higher above stream level.	Top of stream banks 5-10m or higher above stream level.	Top of stream banks 1-5m above stream level.	Top of stream banks less than 1m above stream level.
	16	8	4	2
What is on the streambed?	Rocks and stones of different sizes, tightly packed	Stones, silt present in gaps between rocks /	Gravel, sand and silt.	Sand and silt, stones absent.

Determine risks

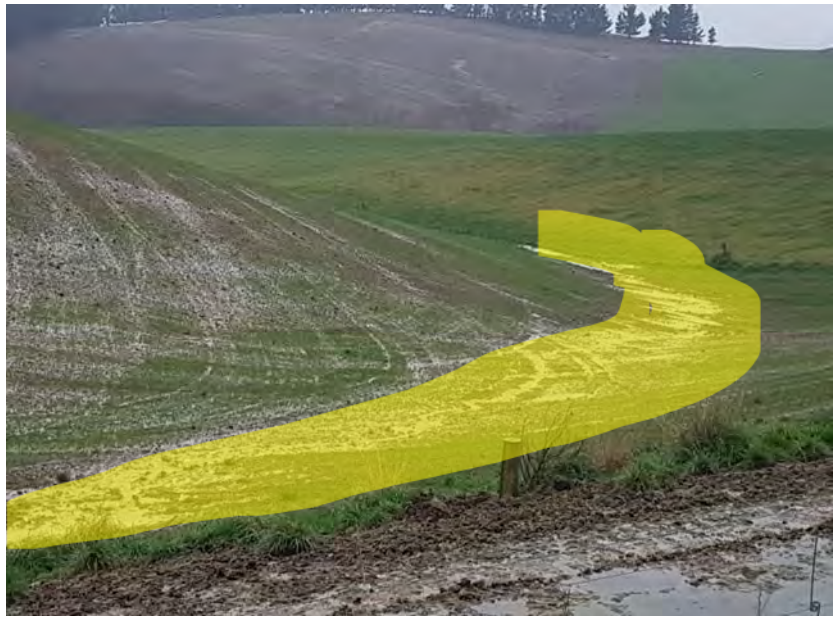
Table 2.1 Risk factors and drivers for freshwater ecosystem health

Outlined below are a range of risk factors to ecosystem health, impacts and drivers which can impact ecosystem health of freshwater environments.

Risk to ecosystem health	Impact to ecosystem health	Driver	On-farm risks	
A. Deposited fine sediment	Sediment accumulates in waterway margins and beds smothering habitat for freshwater fish and invertebrates.	Sediment loss from overland flow due to erosion, or run-off from tracks and yards. It is often impossible to see sediment flows except in high rainfall events. But sediment flow can occur even with very small rainfall events. It is the very fine particles (clay) which have the greatest impact.	• Slope • Rainfall • Erosion-prone soils • Low vegetation cover • Poorly located and/or maintained tracks and yards • Bare soil • Stream bank erosion • High proportion of heavier stock on erosion-prone soils • Riparian margin width too narrow for adjacent activities • Riparian margin vegetation inadequate • Location of stored feed such as baleage, silage pits etc close to waterways resulting in heavy machinery use nearby • Cropping on a slope, particularly when strip-grazed on heavy soils	 Good substrate  Too much fine sediment
B. Excessive algae / periphyton / slime	Increased plant / slime biomass on stream substrate provides low quality food for stream life. As it decomposes it removes oxygen and alters the water chemistry. It destroys habitat for fish and macroinvertebrates.	High nutrient levels in combination with light from canopy removal. Also, removal of flushing/flood events due to drought, water abstraction or summer low flows. High flows will wash the periphyton off the stones and rocks.	Risk factors as above, and: • Olsen P levels greater than agronomic optimum. • Soil and rock type with low P retention. • Lack of vegetative buffers • Soil type (free-draining soils are greater risk for nitrogen loss) • Stocking rate • Type of livestock (Sheep, Cattle or Deer) • Older vs younger livestock • Over-application of irrigation increases nitrogen risk • Excessive nitrogen fertiliser application • Artificial drainage • Critical Source Areas not well managed • High concentration of nitrogen in diet • Compacted or saturated soil	 Good amount slime  Too much slime

Critical source areas

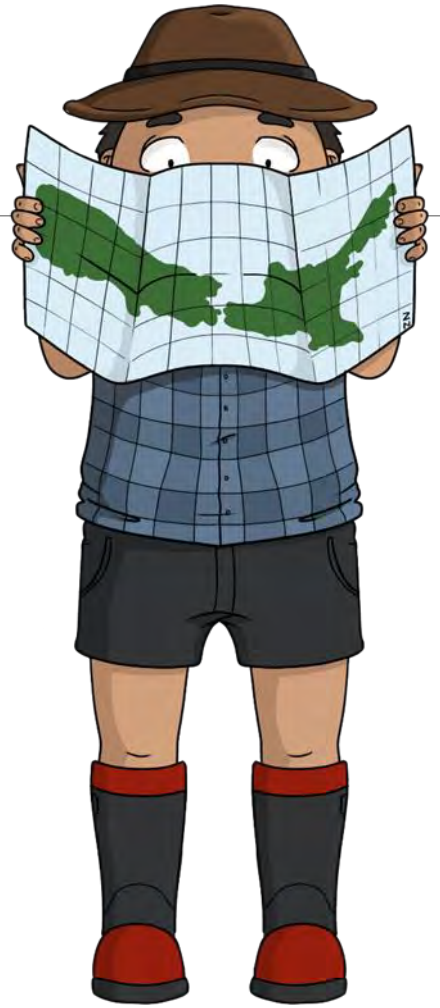
What are the areas of your land that are prone to surface run-off and can carry nutrients and sediment into waterways?



Identifying your CSAs

After rain, grab your gumboots and a farm map!

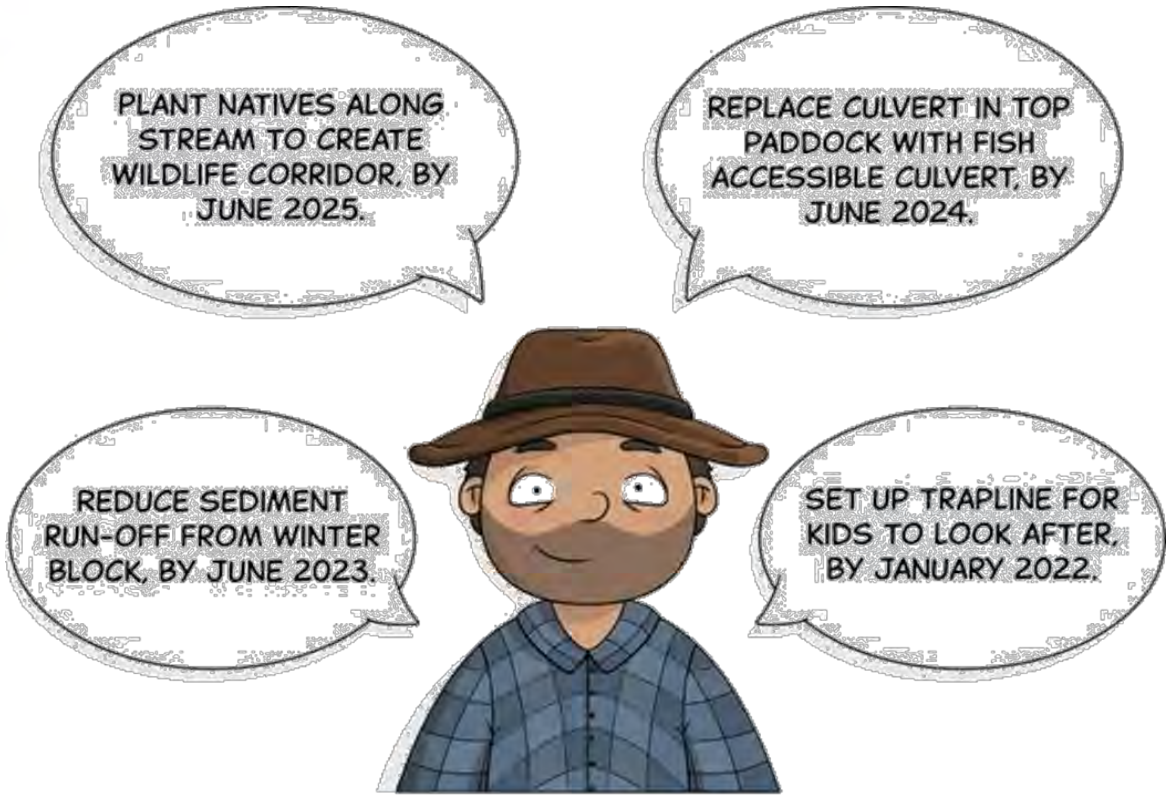
- Where does water flow/overflow?
- Where does water pool?
- Where are your areas of sediment loss?



Convert risks to actions

Freshwater Actions completed to date FW4

Action	Location	Date or year
Pull back fence to 3m margin	Back paddock	April 2023
Shift trough away from stream	Home paddock	June 20023



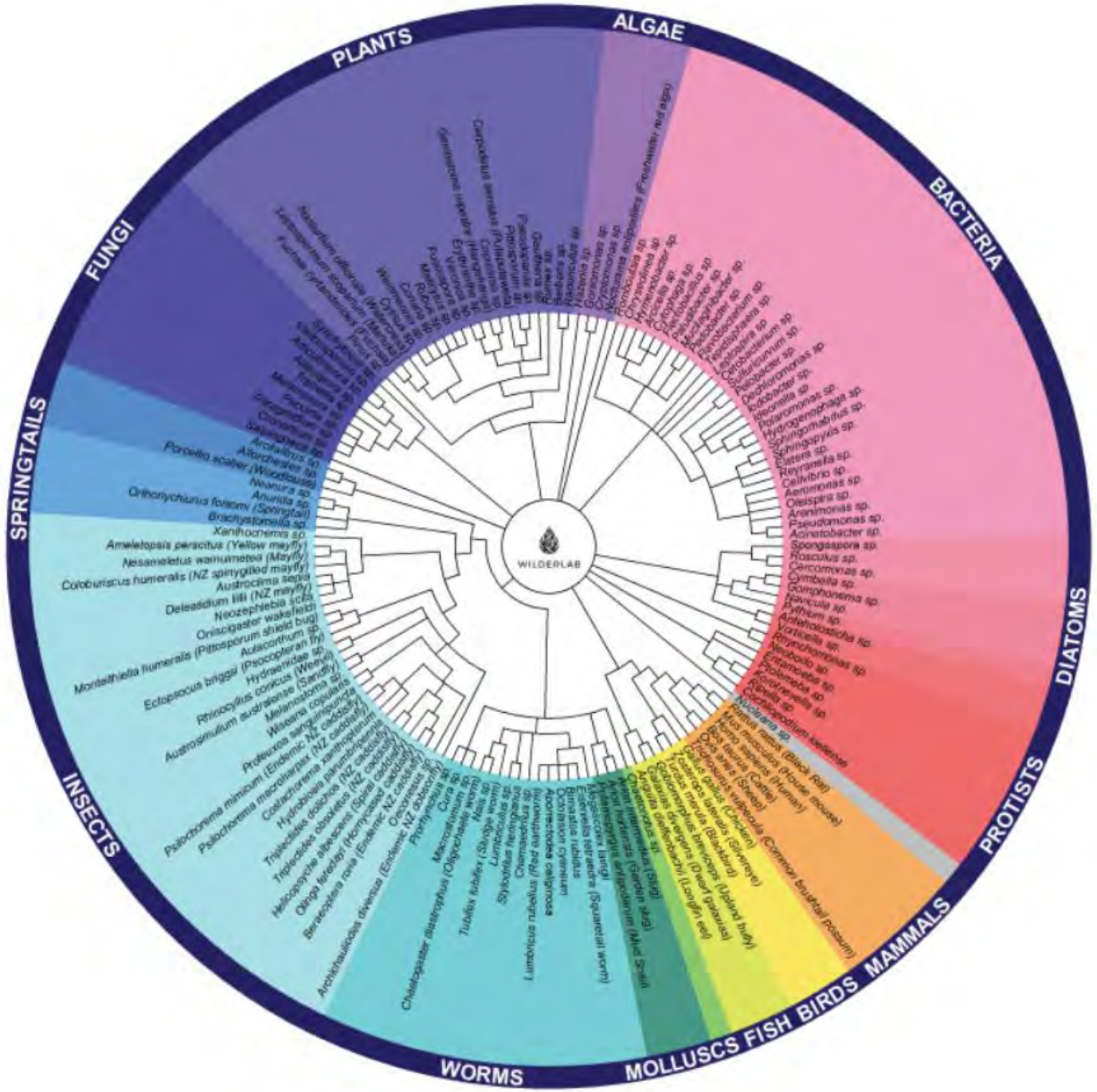
Ongoing monitoring

Freshwater Monitoring Plan

FW5

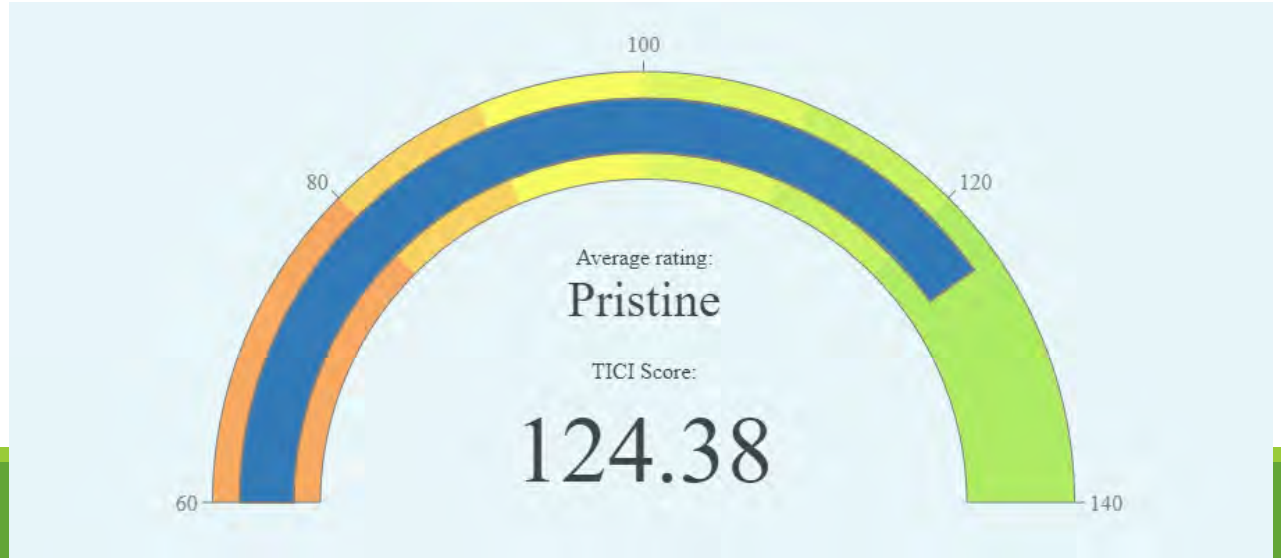
Waterway Site Name	Monitoring Frequency	Date due to monitor	Assessment type	Person Responsible	Notes and scores	Date completed

Environmental DNA



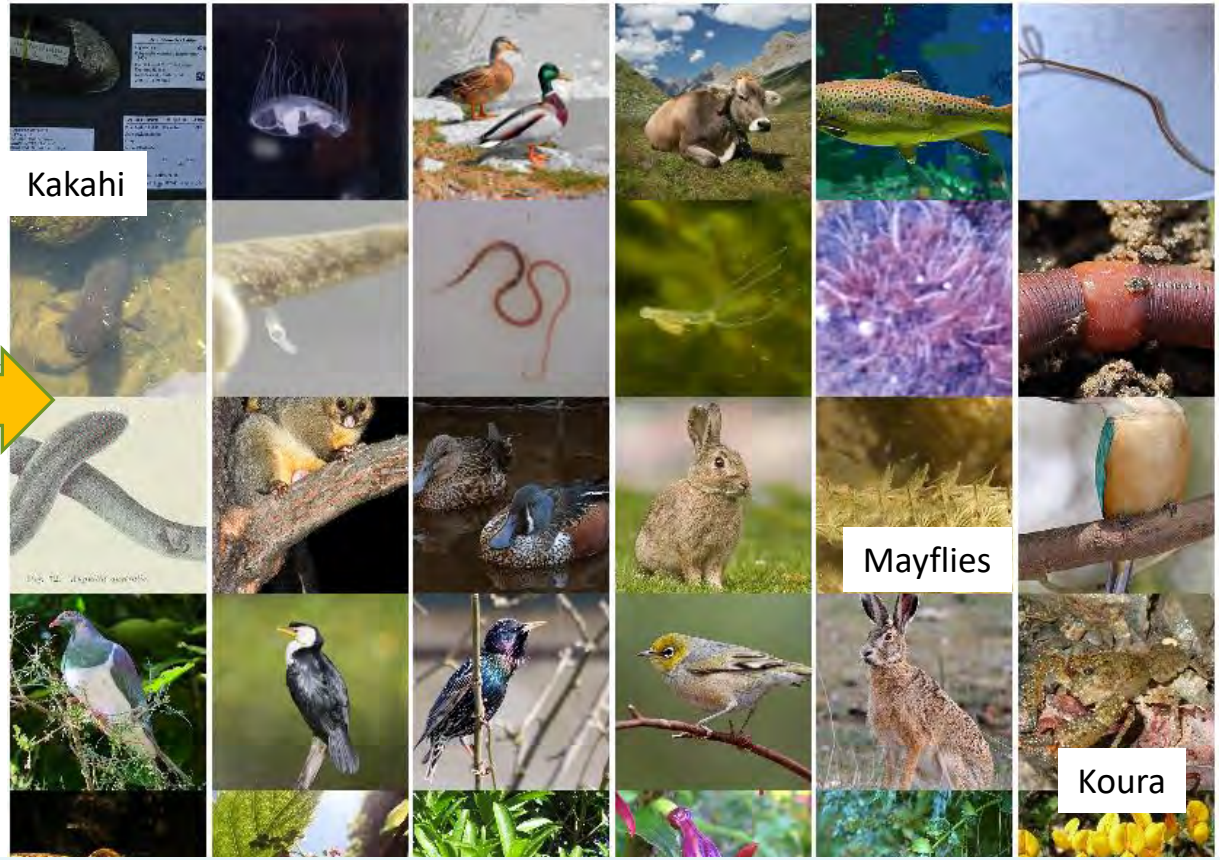

Koaro
Mayflies
Kiore
Banded Kokopu
Whio
Koura


Longfin eel
Possums
Cows
Stonefly
Brown trout

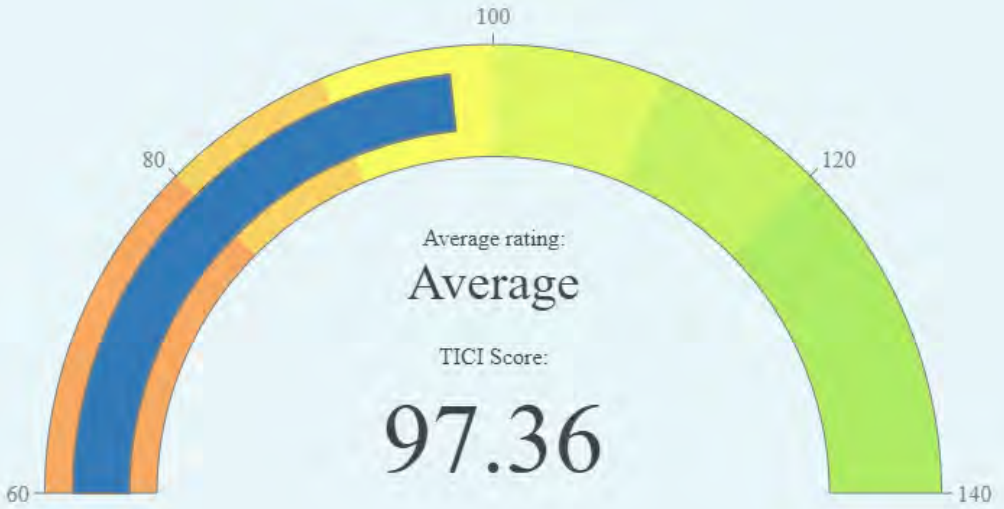

100
80
120
Average rating:
Pristine
TICI Score:
124.38
60
140


100
80
120
Average rating:
Excellent
TICI Score:
119.67
60
140


worms
Shortfin eel

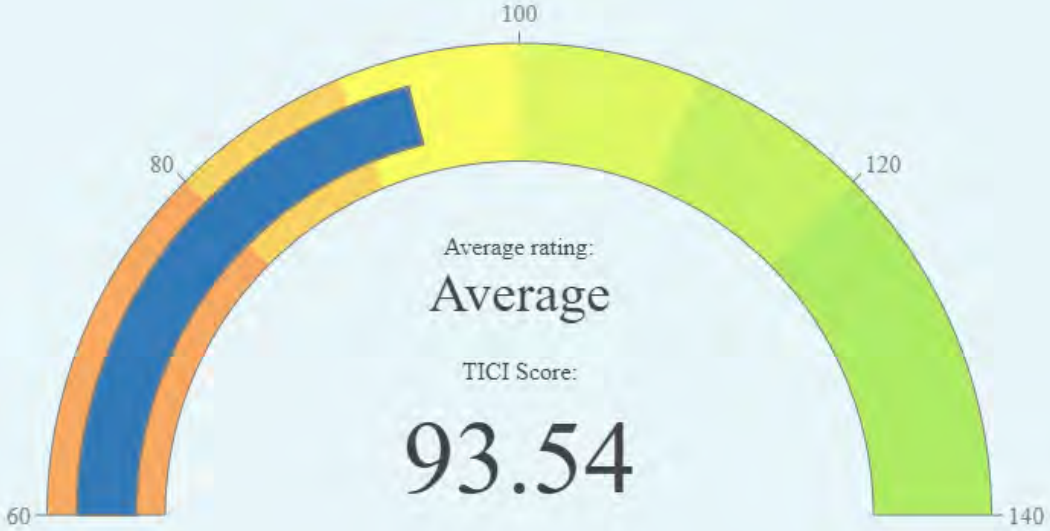

Kakahi
Mayflies
Koura

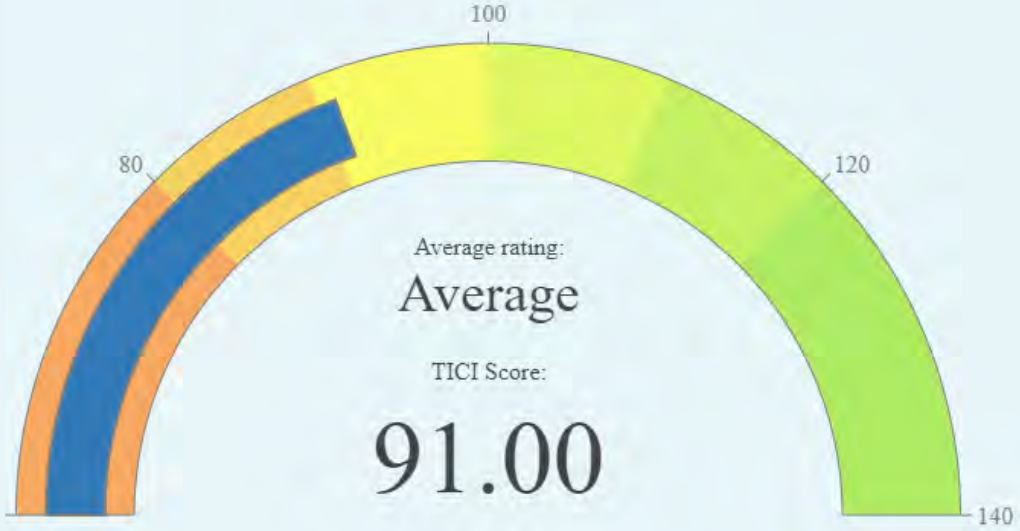

100
80
120
60
140
Average rating:
Good
TICI Score:
109.99


100
80
120
60
140
Average rating:
Average
TICI Score:
97.36


cows


Lamprey
Kokopu
Sheep


100
80
120
Average rating:
Average
TICI Score:
93.54
60
140


100
80
120
Average rating:
Average
TICI Score:
91.00
140

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Thank you!

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