Waimatā – Pakarae Catchment Advisory Group – Hui 7

Date: 5 November 2024

Subject: State of Environment – Baseline and Target Attribute States

1. Introduction

The first part of developing a catchment plan under the NPSFM is identifying the vision, values and environmental outcomes for the catchment. Once these are established then we can consider how well the catchment water quality and quantity meet those environmental outcomes – and what action might be needed to either maintain the values, or to improve the situation where environmental outcomes are not being met.

2. State of Environment

At Hui 1 a summary report was provided that outlined the state of environment as understood by the Council, based on its water monitoring programme. This compared water quality in monitored waterbodies to the National Objectives Framework of the government. Under this framework, sites can be rated as A, B, C, D or E band. There is a National Bottom Line that sites must meet, or action taken by the Council to improve water quality.

Assessments on urban stormwater contaminants were also undertaken in 2014 and 2024, and we modelled water quality across the catchment, using several predictive models.

Key takeouts from data collected and modelled data:

- **Aquatic ecosystem health** across all monitored sites is poor and falls below national bottom lines, as reflected in **Macroinvertebrate Community Index** (MCI) scores, except at one site[1]. The data suggests that MCI scores are overall over time improving or staying the same in monitored waterways.
- Work is currently being undertaken on the **Fish Index of Biotic Integrity** (F-IBI), which will provide further information when complete.
- **Periphyton** (algae) levels are above the national bottom line, except at the Wainui Stream monitoring site. Most sites are Band A and B. Considering a limited data record.
- **Nutrient** levels are generally good for Ammonia and Nitrate levels, although Ammonia levels appear to be increasing. High **Dissolved Reactive Phosphorus** (DRP), below or close to the national bottom line, is attributed to significant sediment loads entering waterbodies. The data suggests that DRP scores are overall over time

[1] Whakauranga Bridge at West Ho Rd, which scored as C band.

improving or staying the same in monitored waterways; the exception is the Kopuawhakapata, which has a declining trend.

- While **dissolved oxygen** (DO) levels are good at monitored sites, only two sites[2] have been monitored. This is inadequate to draw any catchment conclusions. A lack of shading and low water levels in summer are likely to cause low DO levels.
- **E.coli** levels across all monitored sites is poor and falls below national bottom lines. Monitored sites, the Waimatā (at ANZAC park) and Hamanatua lagoon score as poor for primary contact recreation. The data suggests that E.coli scores are improving in the Hamanatua, Waimatā and Wainui.
- The community is warned of potential health risks when swimming in the Turihaua and Hamanatua lagoons, because of agricultural runoff. The Wainui Stream mouth is unsuitable for swimming because of urban wastewater issues. Pouawa, Turihaua, Makorori, Okitu, and Kaiti beaches are safe for swimming approx. 95%, 80%, 92%, 95%, 88% of the time in summer (based on **Enterococci** samples).
- **Suspended fine sediment** (SFS) levels are below the national bottom line in the Kopuawhakapata Stream and Waimatā River (at Grant Road). The data suggests that SFS scores are overall over time worsening in monitored waterways.
- **Deposited fine sediment** (DFS) is below the national bottom line in the Wainui Stream and the Pakarae River (but based on a limited data record).
- **Stormwater contaminants** are high across most urban waterways. This includes high levels of copper, lead, and zinc, and low levels of chromium.
- **Water temperature** is relatively high.

The above is based on the best available information. The MCI, DO, SFS, and DFS data record does not fit all criteria specified in the NOF and therefore the result is indicative only.

3. Baseline Attribute States

The NPSFM requires that water quality is not allowed to degrade from the Baseline Attribute State. This is set as being the water quality for each attribute, as of September 2017.

Key attributes for which the baseline attribute states (BAS) have been calculated are outlined in the tables below. Alongside this a Reference State (based on modelling) is provided. This gives an indication of what we could expect if the catchment was fully returned to native vegetation. This information will help us in understanding what might be possible in terms of improvement.

Nutrients

Council Monitoring Site	Baseline Attribute State	Reference State (modelled if catchment fully revegetated with natives)
Waimatā River at Monowai Bridge	Ammonia B Band Nitrate A Band Phosphorus C Band	Ammonia A Band Nitrate A Band Phosphate B Band

[2] Waimatā at Monowai Bridge and Goodwin's bridge.

Pakarae River at Pakarae Station Bridge	Ammonia B Band Nitrate A Band Phosphorus C Band	Ammonia A Band Nitrate A Band Phosphate B Band
Waimatā River at Goodwins Rd Bridge	Ammonia B Band Nitrate A Band Phosphorus C Band	Ammonia A Band Nitrate A Band Phosphate B Band
Waimatā River at Grant Rd	Ammonia B Band Nitrate A Band Phosphorus D Band	Ammonia A Band Nitrate A Band Phosphate B Band
Kopuawhakapata Stream at Hirini St	Ammonia B Band Nitrate A Band Phosphorus D Band	Ammonia A Band Nitrate A Band Phosphate C Band
Hamanatua Stream at Okitu Bridge	Ammonia B Band Nitrate A Band Phosphorus D Band	Ammonia A Band Nitrate A Band Phosphate B Band
Wainui Stream at Pare Street	Ammonia B Band Nitrate B Band Phosphorus D Band	Ammonia A Band Nitrate A Band Phosphate C Band

Nutrient tests undertaken in urban streams in stormwater assessments also show relatively low nutrient concentrations.

Discussion

These results indicate that in the main rivers and urban watercourses nutrients are not a significant concern.

Tairāwhiti geology has a naturally high level of phosphorus which is why the reference states are in B and C band. This is important to understand when considering what level of improvement is actually possible. Phosphorus is also normally attached to sediment and introduced into water from this mechanism. Managing erosion and sediment generation can be one of the most effective ways to reduce phosphorus. Because phosphorus is so abundant in the Tairāwhiti – and the Waimatā-Pakarae catchment environment, if there are issues with periphyton and algal blooms due to nutrient levels then managing shading levels over the waterbody is likely to be more effective than trying to reduce nutrients. This addresses both light levels and water temperature, which can have a key influence on periphyton growth and ammonia levels. However, periphyton does not appear to comprise a significant issue at present in Waimatā-Pakarae waterways[3].

Ammonia is both a contaminant in its own right (from animal wastes and some types of fertilizer) and a breakdown product from nitrate when water temperatures are high. It is very toxic to fish even in small amounts. Ammonia levels in the Waimatā-Pakarae catchment are similar to other sheep and beef farming areas in Tairāwhiti.

[3] This may change when SFS and DFS is improved, and light levels increase, and therefore needs to be monitored.

Suspended Fine Sediment

Council Monitoring Site	Baseline Attribute State	Reference State (modelled if catchment fully revegetated with natives)
Waimatā River at Monowai Bridge	Visual Clarity C Band	Visual Clarity A Band
Pakarae River at Pakarae Station Bridge	Visual Clarity C Band	Visual Clarity A Band
Waimatā River at Goodwins Rd Bridge	Visual Clarity D Band	Visual Clarity A Band
Waimatā River at Grant Rd	Visual Clarity D Band	Visual Clarity A Band
Kopuawhakapata Stream at Hirini St	Visual Clarity D Band	Visual Clarity A Band
Hamanatua Stream at Okitu Bridge	Visual Clarity B Band	Visual Clarity A Band
Wainui Stream at Pare Street	Visual Clarity B Band	Visual Clarity A Band

Discussion

Visual clarity is important for aquatic life (so they can see their food – and breathe) and for recreation. Land clearance for sheep and beef farming and commercial forestry has changed the Waimatā-Pakarae Catchment environment, with significant erosion and sedimentation taking place. Much of the land is inherently highly erodible, and sources of sediment include landslips, earth flows, reworking of deposited sediment in riparian areas, sediment discharged from forestry operations, erosion off pasture areas, and riverbank erosion. Mud volcanoes also contribute to sediment.

Revegetation, stabilising eroding areas, and retiring high risk land are key methods that could be used to improve the visual clarity of the water, as well as land use controls over beef and sheep farming and commercial forestry. Reinstatement of wetlands, between sources of sediment and rivers and streams, is an effective tool to capture sediment while also slowing flows.

However, achieving the A Band is unlikely to be something that can be aspired to within our lifetimes. The combined erosion processes also mean this will be a hard attribute to see improvements in the short term, and we need to be thinking about what longer term goals might be.

Deposited Fine Sediment

We do not have sufficient data to determine the baseline state, and further work is currently underway to consider the reference state. The information that has been collected shows the Wainui Stream and Pakarae as falling below the national bottom line, with other sites spanning Bands A to C. This banding is low confidence on account of limited data, and further monitoring is necessary.

Discussion

Deposited fine sediment can have an overarching negative impact on aquatic life, as the sediment clogs and smother the habitat that freshwater organisms rely on. While visual clarity is important, this effect is likely to be relatively short-lived in this catchment, as sediment is considered to settle out fairly quickly – this deposited fine sediment persists much longer, affecting aquatic life on an ongoing basis.

Management measures identified for improving visual clarity also apply to DFS. Likewise, achieving the A Band is unlikely to be something that can be aspired to for DFS within our lifetimes.

Bacteria

Council Monitoring Site	Baseline Attribute State	Reference State (modelled if catchment fully revegetated with natives)
Waimatā River at Monowai Bridge	E.coli E Band	E. coli A Band
Pakarae River at Pakarae Station Bridge	E.coli D Band	E. coli A Band
Waimatā River at Goodwins Rd Bridge	E.coli D Band	E. coli A Band
Waimatā River at Grant Rd	E.coli D Band	E. coli A Band
Kopuawhakapata Stream at Hirini St	E.coli E Band	E. coli A Band
Hamanatua Stream at Okitu Bridge	E.coli D Band	E. coli A Band
Wainui Stream at Pare Street	E.coli E Band	E. coli A Band

Discussion

E.coli levels are consistently poor across the catchment. In-stream high E.coli levels are reflected in bacteria levels in lagoons and coastal recreation (primary contact) areas near rivr / stream mouths. In rural areas, beef and sheep farming as well as pest animal species are sources of bacteria, while urban sources include the wastewater network, pets, and possibly on-site wastewater systems.

We have undertaken faecal source tracking (FST), which has given us insights into the above sources. Further FST work is proposed.

Forestry is known to be the location of large numbers of deer and goats, and pest control is generally restricted to the time around and immediately following replant. In other catchments (e.g., Mōtū) pest animals have been identified as a source of E.coli, so it will be good to better understand sources, to inform what might be effective management methods. Further work is being undertaken in similar catchments in Tairāwhiti, which will shed light on the influence of pest animals on E.coli.

In urban areas, it will be good to gain a better understanding of the relative sources of E.coli, incl. livestock within rural parts of urban catchments, pets, the wastewater network,

and on-site wastewater systems. Further investigations are proposed to be undertaken in the Waimatā-Pakarae catchment.

The DrainWise programme is aimed at progressively reducing network wastewater issues.

Ecology

Council Monitoring Site	Baseline Attribute State	Reference State (modelled if catchment fully revegetated with natives)
Makahakaha Stream	MCI D Band	MCI C Band
Pakarae River at Pakarae Station Bridge	MCI D Band	MCI B Band
Pakarae Trib at Whangara Rd	MCI D Band	MCI C Band
Pakarae Trib Stevens Road	MCI D Band	MCI C Band
Waimatā River at Goodwins Rd Bridge	MCI D Band	MCI C Band
Waimatā River at Monowai Bridge	MCI D Band	MCI B Band
Wainui Str at Heath Johnston Park	MCI D Band	MCI A Band
Waiomoko River at SH35 Bridge	MCI D Band	MCI C Band
Whakauranga Br at West Ho Rd	MCI C Band	MCI C Band

The negative relationship between urban development and MCI scores is well-documented and it can be assumed that MCI scores in urban waterways will be below the national bottom line or close to it. The one site that is monitored, Wainui Stream at Heath Johnston Park, falls into D Band.

We are currently undertaking work on the Fish Index of Biotic Integrity, and will report on this once done.

Discussion

Baseline states reflect the large-scale changes that have occurred in the form and nature of waterways in the Waimatā-Pakarae catchment, since deforestation. In this catchment, land-use changes include conversion into commercial forestry, beef and sheep farming, and urban development. These have resulted in water quality, hydrology, and physical habitat changes.

It will also be hard to achieve significant MCI improvements in these waterways in the short long term, as multiple factors affect MCI scores. Research into the drivers of poor ecosystem health in Tairāwhiti Streams indicates that sediment levels are a major driver of poor ecological health.

However, measures such as riparian planting, stock exclusion, wetland restoration / creation, and contaminant reductions will improve ecological health. A key issue comprises water temperature, and riparian planting is critical for mitigating thermal effects on aquatic life. It will be easier to effect change in small waterways as opposed to the larger rivers.

Stormwater contaminants

The NPSFM does not include bands for stormwater contaminants such as coppper, zinc, lead, chromium, and hydrocarbons. However, contaminant concentrations have been compared against ANZECC guidelines, and copper, lead, and zinc need to be mannaged.

Discussion

Stormwater pollution will be managed through regional plan rules for new development, as well as progressive water quality improvements over time envisaged through the Stormwater Integrated Catchment Management Plan (ICMP) and action plans identified through the Waimatā-Pakarae catchment planning process.

While it can take a long time to reduce contaminant levels, meaningful ecosystem health improvements can be obtained through habitat improvements, which are also considered.

Missing Attributes/Gaps in the Data

Note:

- The information in this report only covers some of the water quality attributes we are required to set Baseline and Target Attribute States for in the catchment plan.
- Further work is being undertaken considering trends.

Further monitoring is planned over the summer of 2024/2025 to try and fill some of the data gaps, so that we can identify baseline and current states for these attributes to inform catchment plans.

Particular areas where we need more information for the Waimatā-Pakarae Catchment Plan are:

- Periphyton
- Fish
- Deposited fine sediment
- Dissolved oxygen
- All attributes in the small coastal catchments

We are also working with mana whenua on their values and environmental outcomes, and the working group, which may result in additional attributes that address values such as:

- Natural form and character
- Mahinga Kai
- Other Māori freshwater values

Significant work has been undertaken in the mana whenua space, which is being worked through.

4. Target Attribute States

A key component of the Catchment Plan is the identification of target attribute states (TAS) and the timeframes to achieve them. For many parts of the catchment, current water quality does not support the values or environmental outcomes sought. However, improving water quality is not a fast or easy process. The target attribute states need to take the catchment towards those environmental outcomes and the NPSFM directs that these need to be both realistic but also ambitious.

The following approach is proposed in drafting the proposed target attribute states:

- **Where the water quality attribute is within the A or B band**, the target should generally be to maintain the current state. This recognises that that water quality attribute is not likely to be a major contributor to not achieving environmental outcomes.
- **Where the water quality attribute is currently degrading, and/or below the national bottom line and/or at a level where it is impacting on the values of the waterbody**, targets should be set.
- It needs to be recognised that water quality problems are difficult and slow to address. **Targets need to be ambitious but realistic.**
- **For degrading attributes**, it is proposed that the first five-year target would focus on stabilising water quality and halting the declining trend. The second five-year target would be to reverse the degrading trend, and the longer-term target (15-30 years) is to reach the national bottom line (NBL) or the next band.
- Depending on how bad things are, **for attributes below the national bottom line or where values are not being met**, interim targets could be to improve within a band, with longer term (15-30 year) targets to meet national bottom lines or the next band.
- **Where it is unlikely that a national bottom line can be met within 30 years**, the 30-year target may be an interim target.

The implications of this approach are summarised in the table below. These targets need to be considered in terms of – *are these outcomes realistically achievable?*

Site	Attribute	Target Attribute State Proposed
<u>Larger watercourses</u> Pakarae River, Turihaua, Pouawa, Waiomoko, and Hamanatua monitoring sites	Dissolved Reactive Phosphorus	Maintain current baselines, reduce DRP through achievement of sediment reductions.
	Suspended Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 20 years.
	Deposited Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 20 years.
	E.coli	Reach levels that are safe for primary contact recreation and Mahinga Kai during summer within 10 years; and levels that are safe for primary contact recreation and Mahinga Kai during all year round within 20 years.
	Enterococci (for linked coastal environments)	
	Macroinvertebrates	Maintain current baselines, aim to meet National Bottom Line within 20 years.

	Dissolved Oxygen	Maintain current baselines , aim to meet National Bottom Line within 10 years; and meet top of C Band within 30 years.
<u>Larger watercourses</u> Waimatā River monitoring sites	Dissolved Reactive Phosphorus	Maintain current baselines, reduce DRP through achievement of sediment reductions.
	Suspended Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 30 years.
	Deposited Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 30 years.
	E.coli	Reach levels that are safe for primary contact recreation and Mahinga Kai during summer within 10 years; and levels that are safe for primary contact recreation and Mahinga Kai during all year round within 20 years. **Consider if this is possible within urban reaches of the Waimatā River.**
	Enterococci (for linked coastal environments)	
	Macroinvertebrates	Maintain current baselines, aim to meet National Bottom Line within 30 years.
	Dissolved Oxygen	Maintain current baselines, aim to meet National Bottom Line within 10 years; and meet top of C Band within 30 years.
	Stormwater contaminants	Maintain current baselines, aim to meet 80% species protection levels within 20 years, for copper and zinc; aim to meet 90% species protection levels within 20 years
Rural tributaries monitoring sites	Dissolved Reactive Phosphorus	Maintain current baselines, reduce DRP through achievement of sediment reductions.
	Suspended Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 20 years.
	Deposited Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 20 years.
	E.coli	Reach levels that support achievement of target attribute states for the larger watercourses
	Enterococci (for linked coastal environments)	
	Macroinvertebrates	Maintain current baselines, aim to meet National Bottom Line within 20 years.
	Dissolved Oxygen	Maintain current baselines, aim to meet National Bottom Line within 10 years; and meet top of C Band within 30 years.
<u>Small watercourses</u> Urban watercourses monitoring sites	Dissolved Reactive Phosphorus	Maintain current baselines, reduce DRP through achievement of sediment reductions.
	Suspended Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 10 years.
	Deposited Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 10 years.
	E.coli	Reach levels that are safe for primary contact recreation and <u>some</u> Mahinga Kai during summer within 10 years; and levels that are safe for primary contact recreation and Mahinga Kai during all year round within 30 years.
	Enterococci (for linked coastal environments)	

		Consider if this is possible within urban watercourses.
	Macroinvertebrates	Maintain current baselines, aim to meet National Bottom Line within 20 years.
	Dissolved Oxygen	Maintain current baselines, aim to meet National Bottom Line within 10 years; and meet top of C Band within 20 years.
	Stormwater contaminants	Maintain current baselines, aim to meet 80% species protection levels within 20 years, for copper and zinc; aim to meet 90% species protection levels within 20 years
Lagoons and stream / river mouths monitoring sites	E.coli Enterococci (for linked coastal environments)	Reach levels that are safe for primary contact recreation and some Mahinga Kai during summer within 10 years; and levels that are safe for primary contact recreation and Mahinga Kai during all year round within 30 years.
	Stormwater contaminants	Maintain current baselines, aim to meet 80% species protection levels within 20 years, for copper and zinc; aim to meet 90% species protection levels within 20 years
	Suspended Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 10 years.
	Deposited Fine Sediment	Maintain current baselines, aim to meet National Bottom Line within 10 years.

Questions
Do you agree with the proposed approach to setting targets? What should change? Are there some things which should be prioritised?

Key Definitions Used in this Report

Attribute: A measurable indicator of water quality

- chemical e.g. nitrate levels (mg/L)
- biological e.g. Macroinvertebrate index (MCI)
- Physical e.g. visual clarity (metres)

Baseline Attribute State: What an attribute was like on 7 September 2017 – but for some attributes the date is when we notified the operative Waipaoa Catchment Plan - August 2015. Measured at specified monitoring sites.

Target Attribute State: What we want that attribute to be like to achieve the environmental outcomes.

Interim Targets: 10-year milestones on the path to the Target Attribute State.