Taranaki Regional Council

AGENDA
Policy & Planning

Tuesday 3 September 2024 10.30am

Policy and Planning Committee

03 September 2024 10:30 AM - 12:00 PM

Agenda Topic — Page

Date: 3 September 2024

Subject: **Policy and Planning Committee Minutes – 23 July 2024**

Author: M Jones, Governance Administrator

Approved by: A D McLay, Director - Resource Management

Document: 3298400

Recommendations

That Taranaki Regional Council:

a) takes as read and confirms the minutes of the Policy and Planning Committee meeting of the Taranaki Regional Council held in the Taranaki Regional Council chambers, 47 Cloten Road, Stratford on Tuesday 23 July 2024

b) notes the recommendations therein were adopted by the Taranaki Regional Council on Tuesday 6 August 2024.

Appendices/Attachments

Document 3292506: Policy and Planning Committee Minutes – 23 July 2024

Date:	23 July 2024	
Venue:	Taranaki Regional Council Boardroom, 47 Cloten Road, Stratford	
Document:	3292506	
Present:	C L Littlewood	Chairperson
	S W Hughes	
	B J Bigham	zoom
	D M Cram	
	D H McIntyre	
	A L Jamieson	
	N W Walker	(ex officio)
	P Moeahu	Iwi Representative
	E Bailey	Iwi Representative
	M Ritai	Iwi Representative
	L Gibbs	Federated Framers
	B Haque	New Plymouth District Council (left meeting at 11.04am)
	C Filbee	South Taranaki District Council
Attending:	S J Ruru	Chief Executive (zoom)
	A D McLay	Director – Resource Management
	M J Nield	Director – Corporate Services
	A J Matthews	Director – Environment Quality
	L Hawkins	Planning Manager
	F Kiddle	Strategy lead
	L Hawkins	Policy Manager
	C Woollin	Communications Advisor
	J Reader	Communications Manager
	A Bunn	Systems Engineer
	M Jones	Governance Administrator

The meeting opened at 10.56am.

1. Appointment of Chair

1.1 In the absence of Councillor Williamson, the Chair of the Policy and Planning Committee. Mr A D McLay requested the Committee nominate a Chairperson. Councillor Littlewood was nominated by Councillor Walker and with no further nominations was successful.

Walker/Littlewood

Apologies: were received and sustained from Councillor C Williamson and G Boyde.

Littlewood/Walker

2. Confirmation of Minutes Policy and Planning 30 April 2024

Resolved

That the Taranaki Regional Council:

a) took as read and confirmed the minutes of the Policy and Planning Committee of the Taranaki Regional Council held at 10.30 on 30 April 2024 at Taranaki Regional Council 47 Cloten Road Stratford

b) noted the recommendations therein were adopted by the Taranaki Regional Council on Tuesday 14 May 2024.

Hughes/Walker

3. 11 June 2024 Policy and Planning Committee meeting items

3.1 The following resolutions have been carried over from the 11 June Policy and Planning Committee meeting, due to the lack of a quorum.

Resolved

That the Taranaki Regional Council:

a) received this agenda memorandum titled 11 June 2024 Policy and Planning Committee Agenda items

b) received the memorandum Future Development Strategy for Ngāmotu New Plymouth

c) noted the decision made by the Future Development Subcommittee to adopt the Future Development Strategy for Ngāmotu New Plymouth on behalf of the Taranaki Regional Council and New Plymouth District Council

d) received the memorandum Office of the Auditor General – Audit on Managing Freshwater Quality

e) noted the Office of the Auditor General's Regional councils' relationships with iwi and hapū for freshwater management – a follow up report (2024)

f) noted the positive progress made in the relationship between the Council and iwi and hapū in the region

g) received the memorandum and attached report entitled Regional Pest Management Plan for Taranaki – Interim Review 2023

h) noted that the Regional Pest Management Plan for Taranaki – Interim Review 2023 report gives effect to a Council commitment in the 2022/2023 Annual Plan to undertake an interim review of the Regional Pest Management Plan

i) noted that the Regional Pest Management Plan for Taranaki continues to be efficient, effective and relevant and that no immediate change is required

j) noted the opportunities to build on efficiency and effectiveness of the Regional Pest Management Plan for Taranaki as part of an earlier review of the Taranaki Regional Council Biosecurity Strategy will be investigated

k) received the June 2024 update on the Freshwater Implementation Programme

l) received the memorandum Target Attribute State Overview – Nutrients in Rivers

m) received the memorandum Source Water Risk Management Areas for Municipal Drinking Water Supplies and the accompanying report Delineation of Source Water Risk Management Areas for selected municipal water supplies in the Taranaki Region

n) noted the item titled Submission on the Local Government (Water Services Preliminary Arrangements) Bill was subsequently presented to Council for consideration and endorsement due to the meeting being abandoned.

McIntyre/Cram

4. Freshwater Implementation Update

4.1 L Hawkins provided an update on the Freshwater Implementation project.

Resolved

That the Taranaki Regional Council:

a) received the July 2024 update on the Freshwater Implementation Programme.

Hughes/Jamieson

5. Land and Water Plan – Conflicts of Interest

5.1 S Ruru gave a presentation on the Local Authorities (Members Interests) Act 1968 and the need for individual members to manage any pecuniary interest in accordance with the provisions of the Act.

5.2 Members were advised to contact S Ruru if they require any guidance with this matter.

Resolved

That the Taranaki Regional Council:

a) received this memorandum Land and Water Plan – Conflicts of Interests

b) noted that the responsibility for managing pecuniary and other conflicts of interest that might arise in relation to a particular decision rests with the individual member concerned

c) encouraged all councillors and Committee members to proactively identify and manage any potential conflicts of interest in an appropriate manner

d) agreed that Council staff should provide proactive guidance and assistance to individual members to assist them with the identification and management of potential conflicts of interest that might arise through the freshwater planning process

e) agreed that where appropriate Council should draft an application to the Auditor-General seeking a declaration to enable members with a pecuniary interest that is not in common with the public to participate in the Land and Water Plan process

f) determined that this decision be recognised not significant in terms of section 76 of the Local Government Act 2002

g) determined that it has complied with the decision-making provisions of the Local Government Act 2002 to the extent necessary in relation to this decision; and in accordance with section 79 of the Act, determines that it does not require further information, further assessment of options or further analysis of costs and benefits, or advantages and disadvantages prior to making a decision on this matter.

Littlewood/Gibbs

6. Parliamentary Commissioner of Environment Report on Land Use Change

6.1 F Kiddle provided and update on the report by the Parliamentary Communiser of the Environment (PCE) on land use change and the implications for Taranaki.

Resolved

That the Taranaki Regional Council:

a) received the memorandum titled Parliamentary Commissioner of Environment Report on Land Use Change

b) noted the content of the Parliamentary Commissioner of the Environment's report Going with the grain: Changing land uses to fit a changing landscape.

Walker/Filbee

General Business

P Moeahu addressed the committee expressing his views on Māori Constituencies.

There being no further business the Committee Chairperson, C L Littlewood, declared the meeting of the Policy and Planning Committee closed at 11.33am.

Policy and Planning

Committee Chairperson: _____

C L Littlewood

Date: 3 September 2024

Subject: **Freshwater Implementation September Update**

Author: L Hawkins, Policy Lead

Approved by: A D McLay, Director - Resource Management

Document: 3300420

Purpose

1. The purpose of this memorandum is to provide a Freshwater Implementation project updated.

Executive summary

2. Set out in this memorandum is an update on the progress of implementing the freshwater package from central government. The memorandum focusses on the key tasks undertaken since the previous Committee meeting, and identifies risks associated with the project and achievement of the project timeframes.
3. The attached report focusses on the key streams of work associated with the freshwater package. This being policy development, implementation of the Freshwater Farm Plan (FWFP) regulations and the communications and engagement timeline.

Recommendation

That Taranaki Regional Council:

a) receives the September 2024 update on the Freshwater implementation Programme.

Background

4. This memorandum updates on progress in implementing the Freshwater Package. An implementation programme was previously presented to, and approved by the Committee. This report provides an overview on the progress of the work programme, specifically focusing on the previous 6 weeks and those ahead. It provides an opportunity for discussions relating to progress and risks identified.

Discussion

5. The attached report (attachment 1) provides a high level overview of the progress made since the last Committee meeting in July 2024, and identifies those tasks to be undertaken in the coming 6 weeks. It also identifies risks associated with the programme, and a copy of the high level engagement strategy.
6. Key discussion points are included in this covering memorandum to draw attention to key areas of work.

Conclusion of consultation outreach

7. Since the previous Committee meeting, the consultation for the development of the proposed Land and Freshwater Plan has concluded. This consultation was focused on draft target setting and relevant management approaches to help achieve the draft targets. The consultation process included a series of face to face community roadshow style drop in sessions, online surveys, online presentations, hui with iwi and hāpu and Special Interest Group meetings. The Consultation period ran from 10 June to the 2 August.
8. Key statistics from consultation period are below (please note additional detail around locations of community meeting were provided in previous Committee meeting):
    a. 549 people attended the community sessions, with over 1100 points of feedback received
    b. 15 people at the online zoom meeting
    c. 74 people attended across the four Special Interest Group Meetings;
    d. Seven hui with iwi and hāpu, with approximately 70 in attendance as follows:
        i. Ngaa Rauru – Monday 29th July
        ii. Taranaki Iwi – Wednesday 31st August
        iii. Ngāruahine – Thursday 1st August
        iv. Ngati Mutunga, Ngati Tama and Ngati Maru – Friday 2nd August
        v. Ngati Ruanui – Thursday 25th July and Monday 5th August
        vi. Te Atitawa – Monday 12th August;
    e. 230 completed surveys
    f. 22 bespoke submissions
    g. 13,066 views of the '*have your say*' website;
    h. Advertising reached:
        i. 142,680 people through radio advertising audience
        ii. 662,481 impressions and reach on social media with 9,158 reactions / comments / shares
    i. Media – 2 TRC media releases and 12 media stories.
9. Overall the style and format of the consultation has received positive feedback from attendees. Staff will continue to use the learnings and feedback received during the consultation session to develop our approach to future consultation processes.
10. The quality and depth of feedback has been of a high standard, and provides staff with direction on refining policy development and science investigations. Staff are now working through the feedback, identifying themes and key points within themes to help refine our policy approach. A summary report of the feedback will be brought to the next Committee meeting in October and this will set out the feedback topic by topic.
11. In terms of general feedback across the whole consultation, some emerging themes are noted below:
    a. Timeframes to make improvements – acknowledgement that achieving improvements in water quality and quantity will take time, potentially longer than the 30 year timeframe which was consulted on for some attributes. Equally there was some feedback which considered a generation to be too long for change to occur.
    b. Freshwater values and character – consideration should be given to the different character of rivers and streams, accounting for natural variation and condition, including reference to existing framework for outstanding waterbodies.
    c. Monitoring sites and data availability – identification of areas where monitoring coverage needs to be improved overtime, particularly relevant for hill country areas.
    d. Plan review process – concerns expressed about Council continuing with the plan review process whilst the Government has signaled change in relation to national direction on freshwater policy.

Encourage Council to take additional time with the programme, including further investigations into the economic and social impacts of policy options as they progress.

e. Climate Change – A desire to see climate change impacts assessed across all management options and attributes. Concern that the existing land uses within Taranaki have an overreliance on export markets and thus embedding practice contributing to climate change. This coupled with a desire to see a more local consumption focus. Concern also expressed that farmers will be asked to address the environmental impacts caused by climate change and hence encourage Council to investigate climate change impacts as a 'naturally occurring process'.

f. Outcomes for freshwater health – feedback identified the need for Council to keep in mind the impact freshwater decisions can have on the health and wellbeing of individuals, whanau, communities and the natural environment. Holistic approach to freshwater management will have multiple benefits.

Government direction relating to Freshwater:

12. In the recent 6 weeks no major announcements have been made by the Government in relation to freshwater. However, we have received an update from the Ministry of the Environment regarding their programme of delivery for national direction review. A summary is provided below:
    a. Seven new National Direction instruments will be developed.
    b. 14 existing instruments will be amended through 3 packages for decision-making (Primary Sector, Housing and urban development and Infrastructure and energy). This will enable stakeholders to target their involvement to issues that matter most to them.
    c. For programme purposes – National Direction-making RMA functions will be delegated to the RMA Reform Minister, instead of the Environment Minister (exception being the Conservation Minister for the New Zealand Coastal Policy Statement).
    d. Timing
        i. July – October 2024 (policy development – testing with Treaty partners and stakeholders).
        ii. Early 2025 – statutory process / formal consultation with public and iwi authorities.
        iii. Mid 2025 – Cabinet decision (final reporting and Cabinet decisions on new or amended National Direction).
13. In relation to Resource Management Reforms (RM Reforms), staff provided an overview of the implications of the recent s.107/s.70 High Court decisions at a previous Committee Meeting. The Government has recently announced their intention to make 'time critical' amendments to s.107 of the Resource Management Act (RMA) to address the restrictions around consenting for discharges. No further information around the changes has yet been provided, nor confirmation on whether this will be included in the first or second Bill of the RMA amendments. It is not clear whether amendments will also be made to s.70 of the RMA.
14. On the 8 August the Government also released an update on their 'Local Water Done Well' programme through proposed amendments to the Water Services Act 2021. It is expected that the proposed Local Government Water Services Bill will be introduced to Parliament in December 2024. Of the most relevant to Regional Council are the changes below:
    a. Wider regulatory changes to wastewater standards, which relates to the wastewater environmental performance standards being developed by Taumata Arowai. Legislation is proposed to be amended so there is a single national standard that regional councils will implement through resource consents for wastewater discharges. These amendments are also likely to require associated changes to the RMA.
    b. A range of changes that aim to reduce the cost and burden for drinking water suppliers associated with complying with the Water Services Act 2021. This will include:
        i. excluding 'shared domestic supplies' service 25 customers or less from regulation

ii. regulatory response that is proportionate to the scale, complexity and risk profile of each drinking water supply.

iii. support for mixed-use rural schemes.

c. Provide clarity around Tauamata Arowai giving effect to Te Mana o Te Wai by repealing the requirements to do so, and replace it with a new operating principle for Taumata Arowai to take account of the National Policy Statement for Freshwater Management, and any Regional Plans.

15. Staff are monitoring the progress on these announcements as there will likely be implications to the policy development of the Land and Freshwater Plan. As more detail emerges, updates will be brought back to the Committee for decision making.

Financial considerations—LTP/Annual Plan

16. This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

17. This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Local Government Official Information and Meetings Act 1987.

Iwi considerations

18. This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the Local Government Act 2002) as outlined in the adopted Long-Term Plan and/or Annual Plan. Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum.

19. As set out above a number of hui have been undertaken with iwi and hāpu over the past 6 weeks. Continued conversation with the Pou Taiao are planned for the next 6 week period to progress key areas of policy development.

Community considerations

20. This memorandum and the associated recommendations have considered the views of the community, interested and affected parties and those views have been recognised in the preparation of this memorandum.

Legal considerations

21. This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices/Attachments

Document 3300399: Freshwater Implementation Progress Report – August 2024

Freshwater Implementation Project Report to Policy & Planning Committee

August 2024

	Progress in the last six weeks	Key tasks in the coming six weeks	Risks

National Policy Statement for Freshwater Management	• Concluding consultation
	  ▪ Series of Marae based discussions
	  ▪ Hui with Pou Taiao.
	• Consultation analysis, including preparation of summary report.
	• Progress next steps of policy and science programme to support programme development.
		• Finalise consultation summary report.
		• Meetings with iwi Pou Taiao re key policy directions.
		• Meetings with key stakeholder groups to refine policy direction.
		  ▪ Effluent management framework
		  ▪ Earthworks discussion
		• Progress Science programme:
		  ▪ Additional attributes work and target setting process
		  ▪ Desirable and undesirable fish species
			• Medium risk – Partnership with iwi. Risk that the timeframes, complexity of issues and the need to be working in an agile manner to develop the policy framework will impact on the partnership approach being fostered. Amendments to the Pou Taiao Agreement including the setting up of a steering committee to mitigate this risk. Opportunity to consider amendment to programme to providing more time and opportunity to work through policy drafting. Continue to present progress to the Wai Steering Committee.
			• Medium risk – participation in the community engagement is low. Mitigated through continued promotion of process, community meetings switched to being held at various locations, targeted engagement with industry groups to lessen the load on individuals.
			• High risk –change to direction of the NPSFM with the new government. We can mitigate against this risk by maintaining momentum on policy development, keeping abreast of policy announcements from the government, and taking pause when necessary to confirm approach as policy guidance from the government develops.

Freshwater Farm Plans	• Status quo – as we await further direction from the Government on likely changes to the Regulations etc.	• Status quo – as we await further direction from the Government on likely changes to the Regulations etc.	• Low risk – potential change to direction of FWFP regulations with the new government. The government has signalled the continuation of the FWFP process and Councils should expect an order in council, as such this is a low risk. The continuation of the programme will mitigate against any pressure to respond to an OIC when released.

Engagement and Communication Strategy (Policy Development)

Set out below is a high level summary of the engagement approach and timing for key components supporting the policy development. Also noted is a high level timeline for key communications and engagement activity. Note this engagement plan does not including Council working with their tangata whenua partners, this process is subject to an alternative approach led with the Pou Taiao and Council's Iwi communications advisor.

Phase	Stage	What	Who	Timing*
Phase 1	**Seek to understand** Focus: gathering info from audiences about what's important to them	This phase has covered seeking input on a variety of high level freshwater matters including visions for Freshwater in Taranaki, identification of values for freshwater management and feedback on the proposed FMU boundaries. Input has been sought through a variety of mediums including online surveys, social pinpoint, face to face meetings and drop-in sessions (ie Stratford A&P show).	Community and special interest groups.	Apr 2021 to Mar 2023
Phase 2	**Test options** Focus: building and discussion on options that meet the region's wants and needs	There are two key steps in this process: 1. Testing the building blocks of the National Objectives Framework. A discussion document for each FMU is being prepared and will cover visions, values, baselines and environmental outcomes. 2. Testing TASs and proposed management approaches. 3. Testing limits and targets. This phase will also likely include region wide policy framework discussions.	1. Community – via online consultation opportunity. Special interest groups including industry bodies, catchment groups, government agencies, district councils, environmental NGOs – via workshop discussions. 2. Community and special interest groups. A series of face to face meetings around the region and opportunity for online feedback. 3. Community and special interest groups. A series of face to face meetings around the region and opportunity for online feedback.	Aug 2023 to November 2024
Phase 3	**Present preferred solution** Focus: presentation of best options (draft plan)	A draft plan will be complied and through requirements of the RMA an opportunity for written feedback provided.	Clause 3 – listed in the RMA, and special interest groups.	Early 2025
Phase 4	**Notification: Public submissions** Focus: formal communication relating to Plan notification	In accordance with the approved adapted programme from Council, the Freshwater Plan and Freshwater components of the RPS will be notified by Mid 2025, pending the consideration of any further direction and detail provided by the Government on their freshwater updates. Once notified all interested parties will have the opportunity formally submit written submissions on the notified plan.	All interested parties.	Notification Mid 2025. Submission period mid – late 2025.

Date: 3 September 2024

Subject: **Can I Swim Here? Report Card 2024**

Author: A Collins, Scientist – Water Quality

Approved by: A J Matthews, Director - Environment Quality

Document: 3301582

Purpose

1. The purpose of this memorandum is to provide the Committee with an overview of the results from the 2023/24 'Can I Swim Here?' recreational water quality monitoring programme, and present the associated report card.

Recommendations

That Taranaki Regional Council:

a) receives the Can I Swim Here? Report Card 2024.

Background

2. Every summer between November and March, we work closely with the three district councils and Te Whatu Ora to advise the public on whether water quality in our rivers, lakes and beaches is suitable for swimming and recreation. This monitoring is a requirement of councils across the country, and is delivered as the Can I Swim Here? programme.
3. Prior to November 2021, recreational water quality samples were collected during fine weather. Sampling now occurs weekly regardless of weather conditions. This change brings the monitoring programme into line with national policy requirements and provides our community with greater awareness of the suitability of rivers, lakes and beaches for swimming and recreating during a range of weather conditions.
4. Although elevated numbers of faecal bacteria can be present in waterways during fine conditions, these numbers typically worsen during and after heavy rainfall, when faecal contamination enters waterbodies through run-off or via stormwater. Livestock, birds, dogs and even humans are among the many potential sources of faecal contaminants that can affect recreational water quality.
5. The previous dry weather monitoring approach helped to characterise recreational water quality around the region during fine conditions when people are more likely to swim. However, we know that some people across Taranaki are still getting in the water during wet weather (or soon after), so it is important to collect data during those conditions too.
6. The way in which monitoring results are shared with the public has also evolved in recent years, with online reporting now playing an important and effective role in keeping the public up to date. The Can

I Swim Here? module[1] on the LAWA (Land, Air, Water Aotearoa) website displays the weekly monitoring results for every region in New Zealand.

7. This annual report card provides an overview of the programme, accompanied with a brief summary of the results. Where applicable, results are presented alongside relevant standards or guideline values in order to provide an assessment of environmental state. The intent of these report cards is to ensure they speak to a non-technical audience in order to improve community engagement and understanding.

Discussion

8. This report card presents the most recent results of coastal and freshwater summer monitoring of popular recreation spots across the region.
9. Between 1 November 2023 and 31 March 2024, the Council undertook weekly water quality monitoring at 41 swimming spots across the region, including 23 rivers and lakes, and 18 beaches.
10. Water samples were collected weekly, with freshwater sites tested for *Escherichia coli* (*E. coli*) and marine sites tested for enterococci. These bacteria are indicators of the presence of faecal contamination in the water and associated pathogens which can make people sick. Cyanobacteria (potentially toxic algae) were also monitored every two weeks at selected river and lake sites.
11. Monitoring results were assessed against the Microbiological Water Quality Guidelines (MfE and MoH, 2003) and Cyanobacteria Interim Guidelines (MfE, MoH, 2009) in order to assess whether water quality was suitable for swimming and other recreational activities. Both sets of guidelines follow a risk-based traffic light system, where green indicates a site is suitable for swimming, amber indicates caution is advised, and red indicates a site is unsuitable for swimming at the time of sampling.
12. During the 2023/24 season, 238 of 504 (47%) of routine samples taken from freshwater recreational sites indicated that water quality was suitable for swimming at the time of sampling. Results were elevated to cautionary levels based on 107 (21%) samples, while conditions were unsuitable for swimming at the time of sampling based on 159 (32%) samples. Lake Herengawe and Lake Rotorangi at the Pātea dam had low levels of *E. coli* on the most occasions of all of the monitored sites, although Lake Herengawe was still deemed unsuitable for swimming due to elevated levels of cyanobacteria. Te Hēnui Stream mouth had the poorest water quality with permanent health warnings remaining in place at this site.
13. At popular beach sites, 315 of 377 (83%) of routine samples indicated that water quality was suitable for swimming at the time of sampling. Enterococci numbers exceeded the cautionary guideline in 25 (7%) samples. For 37 (10%) samples, water quality was unsuitable for swimming. Fitzroy Beach had the best water quality out of all monitored beaches, followed closely by Ōākura Beach opposite the campground and Middleton Bay. Waitara East and Waitara West beaches were unsuitable for swimming most often. Urenui Beach was also unsuitable (or caution was advised) on a number of occasions.
14. For benthic cyanobacteria, 20 out of 77 (26%) routine surveys found that the monitored rivers were suitable for recreational use. Cyanobacteria reached cautionary levels during one (1%) survey, and conditions were deemed to be unsuitable for recreation during 56 (73%) surveys. Benthic cyanobacteria levels remained low at the Te Hēnui Stream site throughout the summer period, whereas exposed mats of benthic cyanobacteria caused the Waiwhakaiho River at Merrilands Domain, Waiwhakaiho River at Meeting of the Waters, and Waingongoro River at Ōhawe Beach to be marked as unsuitable for recreational use throughout the entire monitoring season.

[1] Found at www.lawa.org.nz/explore-data/swimming/

15. In lakes, planktonic cyanobacteria levels were suitable for recreational use on 62 out of 77 (80%) routine sampling occasions. Cyanobacteria levels were elevated to cautionary levels during nine (12%) routine surveys, and conditions were unsuitable for swimming during six (8%) surveys. Cyanobacteria levels were suitable for swimming in Lakes Rātāpiko, Rotomanu, Ngangana, and Rotorangi over the entire summer monitoring period, whereas Lakes Ōpunake, Herengawe and Rotokare were unsuitable for swimming on occasion throughout the summer.
16. An assessment of long-term grades for freshwater (*E. coli* and planktonic cyanobacteria) and marine (enterococci) monitoring data was carried out, in accordance with the National Policy Statement for Freshwater Management 2020 (NPS-FM) and the Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (MfE, 2003). The assessment found that only two out of 23 (9%) monitored freshwater swim sites were graded excellent with respect to *E. coli*: Lake Rotorangi and Lake Herengawe. The remaining 21 sites (91%) were graded poor. With regards to planktonic cyanobactera in lakes, four out of seven (57%) lakes were graded excellent, while three lakes (43%) were graded poor. With respect to enterococci long-term grades, six marine sites (33%) were graded fair, while the remaining 12 sites (67%) were graded poor.
17. Under the NPS-FM, sites that have been graded poor are considered to be below the national bottom line; a minimum standard below which action is required to deliver water quality improvements. With regards to *E. coli* at swim spots, councils are required to work with communities to develop action plans for achieving these improvements. We must also work towards reducing levels of *E. coli* and occurrences of planktonic cyanobacteria by setting enforceable rules and limits.

Financial considerations—LTP/Annual Plan

18. This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

19. This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Local Government Official Information and Meetings Act 1987.

Iwi considerations

20. This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the Local Government Act 2002) as outlined in the adopted Long-Term Plan and/or Annual Plan. Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum.
21. Te reo Māori translations of key phrases and concepts have been included in the report card accompanying this memorandum. This represents a step towards enhancing the Council's science reporting programme by producing science outputs that aim to be more engaging for tangata whenua. This will be a continued focus for the overall State of the Environment Report Card series, which is currently under development.

Community considerations

22. This memorandum and the associated recommendations have considered the views of the community, interested and affected parties and those views have been recognised in the preparation of this memorandum.

Legal considerations

23. This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

References

Ministry for the Environment. 2003. *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas.* Wellington.

Ministry for the Environment. 2020. National Policy Statement for Freshwater Management 2020. Wellington.

Ministry for the Environment and Ministry of Health. 2009. *Cyanobacteria in Recreational Fresh Waters – Interim Guidelines.* Wellington.

Appendices/Attachments

Document 3301358: Can I Swim Here? Report Card 2024

Taranaki Regional Council monitors water quality at 41 sites across the region from November to March to check whether it's safe to swim during the summer months. This report card covers the 2023/24 Can I Swim Here? season.

Weekly samples are collected from rivers, lakes and beaches, with freshwater sites tested for *Escherichia coli (E. coli)* and marine sites tested for enterococci. These bacteria are indicators of faecal contamination in the water which can present a health risk at sites used for recreation.

The Council also monitors benthic and planktonic cyanobacteria every fortnight at some of these sites.

Figure 1: Quick guide to the traffic light system used for the weekly assessment of Can I Swim Here? sites.

Weekly monitoring results, long-term grades and permanent health warnings for Taranaki are updated on our website: **trc.govt.nz/can-i-swim**. Further information regarding faecal indicator bacteria and cyanobacteria can also be found on the LAWA website: **lawa.org.nz.**

Ngā whakataunga ngārara kiko mata (ngā awa me ngā roto)
E. coli results (rivers and lakes)

E. coli are an indicator of faecal contamination in freshwater. Although *E. coli* don't always make people sick, they are often found alongside other harmful pathogens and are therefore a useful measure of the suitability of rivers and lakes for recreation.

At the time of sampling, 238 (47%) samples taken from freshwater recreational sites indicated that water quality was suitable for swimming, while 107 (21%) samples had levels of *E. coli* where caution was advised. Conditions were found to be unsuitable for swimming at the time of sampling in 159 (32%) samples.

Lake Herengawe and Lake Rotorangi at Pātea Dam had the best water quality of all monitored sites (Figure 3), while Te Hēnui Stream had the poorest water quality, with permanent health warnings in place at this site. Other locations with permanent health warnings and rāhui can be found on the LAWA website.

Figure 2: Guideline E. coli values for swimming and recreation at freshwater sites.

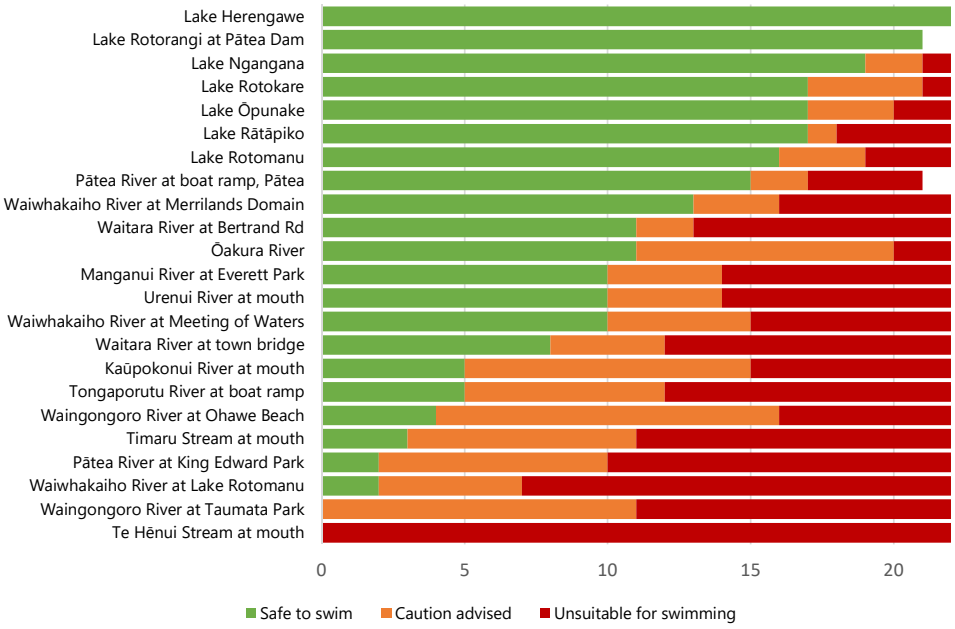


Figure 3: Results of weekly E. coli samples at freshwater sites for the 2023/24 Can I Swim Here? season.

Ngā whakataunga ngārara kōpiropiro (takutai)
Enterococci results (beaches)

Enterococci bacteria are an indicator of faecal contamination in marine waters. Similar to *E. coli*, enterococci are often found alongside other harmful pathogens that can make people sick. Enterococci however, persist longer in saltwater and are therefore a better measure of the risk to human health.

At marine sites, 315 of 377 (83%) samples indicated water quality was suitable for swimming at the time of sampling, while 25 (7%) samples had levels of enterococci where caution was advised. Conditions were found to be unsuitable for swimming at the time of sampling in 37 (10%) of samples. Fitzroy Beach had the best water quality out of all monitored beaches this summer, while Waitara East Beach had the worst (Figure 5).

Figure 4: Guideline enterococci values for swimming and recreation at marine and coastal sites.

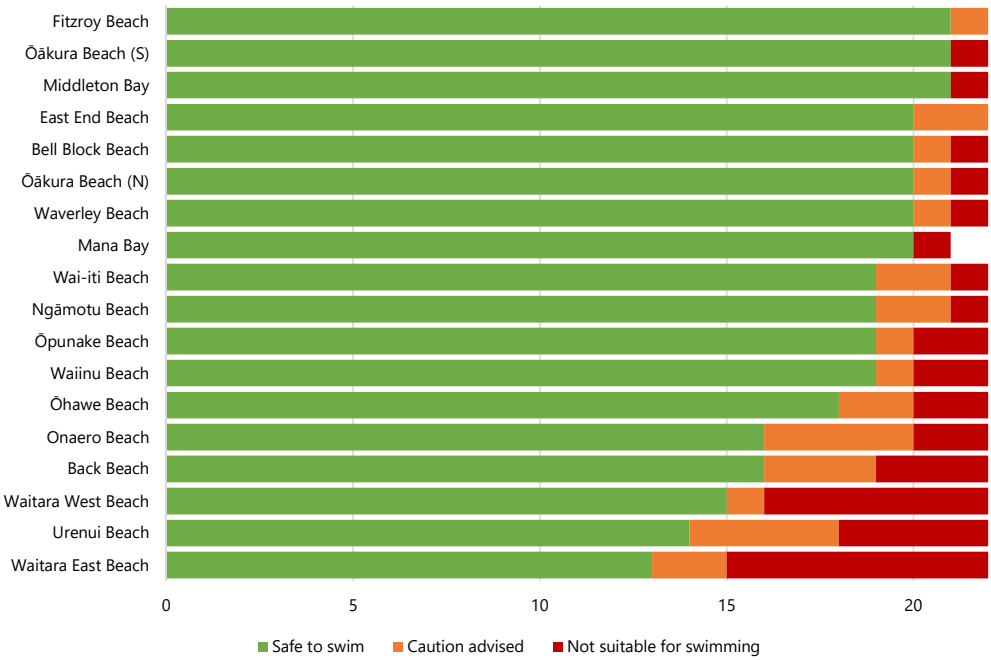


Figure 5: Results of weekly enterococci samples at marine sites for the 2023/24 Can I Swim Here? season.

Ngā whakataunga ngārara kānapanapa (ngā awa me ngā roto)
Cyanobacteria results (rivers and lakes)

Cyanobacteria exist naturally in freshwater, growing as mats on the rocks of a river bed (benthic) or floating and drifting in lakes (planktonic). During the summer months, increased water temperature, reduced rainfall and increased daylight hours provide ideal conditions for cyanobacteria to grow, sometimes resulting in algal blooms. When in bloom, cyanobacteria can produce toxins that can pose a risk to the health of people and animals entering the water.

Sites monitored for benthic cyanobacteria were suitable for recreational use during 20 of 77 (26%) routine surveys, and elevated to a cautionary status during one (<2%) survey. Conditions were unsuitable for recreation during 56 surveys (73%). Cyanobacteria coverage remained low in Te Hēnui Stream, while the Waiwhakaiho River at Merrilands Domain, Waiwhakaiho River at Meeting of the Waters and Waingongoro River at Ohawe Beach were all unsuitable for recreational use due to exposed mats on the edges of these rivers.

Lakes monitored for planktonic cyanobacteria were suitable for recreational use on 62 of 77 routine sampling surveys (80%), and elevated to a cautionary status following nine surveys (12%). Conditions were unsuitable for recreation during six surveys (8%). Lakes Rātāpiko, Ngangana, Rotomanu and Rotorangi were all safe for recreational use throughout the sampling period. Lakes Ōpunake, Rotokare and Herengawe all exceeded guideline levels at some point and were monitored more frequently until results returned to a safe level (Figure 8).

Figure 6: Guideline values for benthic cyanobacteria in rivers (conditions may also be unsuitable for swimming where there are detaching mats and/or exposed mats along the river's edge, even if overall coverage is low).

Figure 7: Guideline values for planktonic cyanobacteria in lakes.

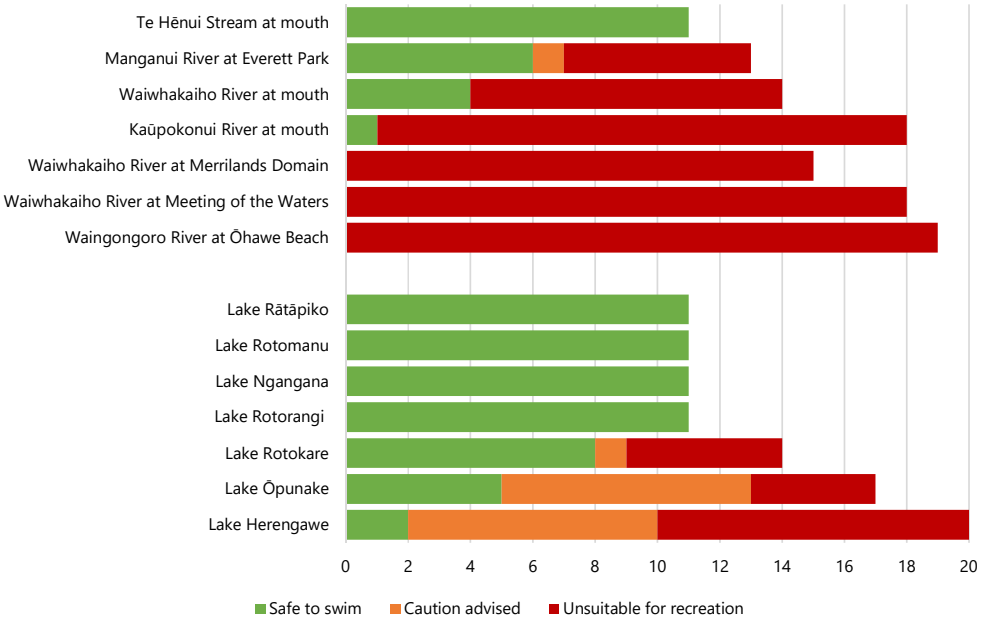


Figure 8: Results of cyanobacteria assessments at rivers and lakes during the 2023/24 Can I Swim Here? season (where results were elevated, sites were monitored more frequently).

Ngā kounga ki tua
Long-term grades

Long-term grades are an indication of whether water quality is generally excellent, good, fair or poor overall during the recreational swimming season. Long-term grades are based on a risk of infection and do not necessarily reflect the conditions on a particular day.

The Council recently changed the way samples are collected so results for *E. coli* and enterococci samples are only available for the last three years (or two years for some newer sites), rather than the recommended five years.

Lake Rotorangi and Lake Herengawe (9%) both have excellent water quality with respect to long-term *E. coli* grades, while the remaining 21 sites (91%) were graded poor (Figure 9). Lake Rotomanu, Lake Rātāpiko, Lake Ngangana and Lake Rotorangi were graded excellent with respect to planktonic cyanobacteria, while Lake Rotokare, Lake Herengawe and Lake Ōpunake were poor. Six marine sites (33%) were fair, while the remaining 12 sites (67%) were graded poor.

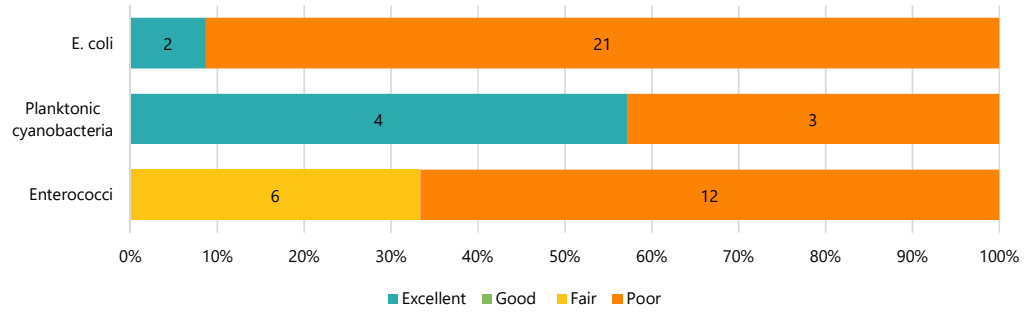


Figure 9: Long-term grades for sites monitored for E. coli, planktonic cyanobacteria and enterococci under the Can I Swim Here? programme.

Date: 3 September 2024

Subject: **Freshwater Macroinvertebrate State of the Environment Monitoring Report 2019-2023**

Author: F Kumeroa, Scientist - Freshwater

Approved by: A J Matthews, Director - Environment Quality

Document: 3300587

Purpose

1. The purpose of this memorandum is to provide the Committee with an overview of the report Freshwater Macroinvertebrate State of the Environment Monitoring Report 2019-2023.

Recommendations

That Taranaki Regional Council:

a) receives the report Freshwater Macroinvertebrate State of the Environment Monitoring Report 2019-23

b) notes the recommendations therein.

Background

2. Section 35 of the Resource Management Act (1991) requires local authorities to undertake monitoring of the region's environment, including land, air and water. To this effect, the Council has established a state of the environment (SoE) monitoring programme for the region.
3. The Council's SoE programme encompasses a number of individual monitoring activities, many of which are undertaken and managed on an annual basis (from 1 July to 30 June). The purpose of SoE reporting is to summarise and interpret regional environmental monitoring results and report on any changes (trends) in these data. One of these activities is a monitoring and reporting programme to assess the state and trends in freshwater macroinvertebrate communities (stream health) within the region.
4. Benthic (meaning "bottom-dwelling") macroinvertebrates encompass a diverse range of aquatic species that play a crucial role in freshwater ecology. They include small aquatic animals such as worms and crayfish (kōura) and the aquatic larval stages of insects such as mayflies, stoneflies, and caddisflies. Macroinvertebrates are found in and around water bodies, attaching themselves to rocks, vegetation, logs and sticks or burrowed into the bottom sand and sediments. Macroinvertebrates play integral roles in stream food webs, and their dynamics are shaped by physical, chemical, and biological conditions of the stream. They feed on organic matter such as periphyton, plants and macrophytes, debris, and each other. Additionally, they serve as important in-stream food sources for fish and

wading birds. Macroinvertebrates in their larval stage will emerge from the water as adults, becoming food for terrestrial animals like birds, bats, and spiders.

5. Benthic macroinvertebrates respond to environmental variables including water quality, hydrology, and habitat, and are used worldwide as sub-indicators of stream health as they respond to human pressures, are taxonomically diverse, and are easy to sample.
6. The Council established its SoE monitoring programme for freshwater macroinvertebrates in 1995, with macroinvertebrate surveys undertaken biannually, in spring (October to December) and summer (February to May) through to 2021/22. Since 2022/23, surveys have been carried out once a year during summer (February to May). The 2023 monitoring year marked the twenty-eighth consecutive year of this programme. The methodology has remained relatively unchanged over time, and there are currently 67 sites monitored throughout 35 rivers and streams across the Taranaki region.
7. The NPS-FM sets out requirements for councils and communities to maintain or improve freshwater (where it is degraded). It includes a National Objectives Framework (NOF) that specifies nationally applicable standards for particular freshwater parameters (referred to as 'attributes') for rivers. Three biotic indices have been developed to assist in determining the ecological health of waterbodies, including the macroinvertebrate community index (MCI), quantitative macroinvertebrate community index (QMCI), and average score per metric (ASPM), all of which are informed by macroinvertebrate communities.
8. The NOF has defined four attribute bands and descriptions for these macroinvertebrate attributes. These bands indicate the level to which the macroinvertebrate attribute is provided for, ranging from band A (indicative of pristine conditions) to band D (indicative of severe pollution or nutrient enrichment).
9. Previously, macroinvertebrate data has been analysed and reported on using regionally-derived tolerance values and bands for Macroinvertebrate Community Index (MCI) only. The 2019-2023 report includes an assessment of Council's macroinvertebrate data against attributes set out in the NPS-FM in addition to an assessment against regionally-derived tolerance values and bands for MCI.
10. The 2019-2023 report comprises three main sections:
    - regional state analysis of taxa richness and MCI scores using regionally-derived scores and bands
    - regional trend analysis of MCI scores using regionally-derived scores
    - state analysis of MCI, SQMCI, and ASPM across regional monitoring sites using nationally-derived five-year medians and bands as required by the NPS-FM.

Discussion

11. The most recent monitoring year (2022/23), was assessed using regionally-derived MCI scores. Three sites (5%) were categorised as having 'excellent' health, 12 sites (19%) were categorised as having 'very good' health, 24 sites (37%) were categorised as having 'good' health, 21 sites (33%) were categorised as having 'fair' health, three sites (5%) were categorised as having 'poor' health, and one site (1%) was categorised as having 'very poor' health. Two new maximum scores in the Pūnehu Stream (PNH000900) and Tāngāhoe River (TNH000090) and one new minimum in the Uruti Stream (URU000198) were recorded.
12. The 2022/23 results indicated a gradual decline in macroinvertebrate community health in a downstream direction (Figure 1). Sites classified as 'excellent' are predominantly located near or within the boundaries of Te Papa-Kura-o-Taranaki, whereas sites scoring 'fair' or lower are closer to the coast. Enhancing stream health, especially at sites in the lower reaches of ring plain streams, is unlikely to be significant or meaningful without substantial improvements in habitat and water quality. Such improvements involve initiatives such as riparian fencing/planting and redirecting discharges from dairy pond treatment systems away from direct surface water disposal to land irrigation.

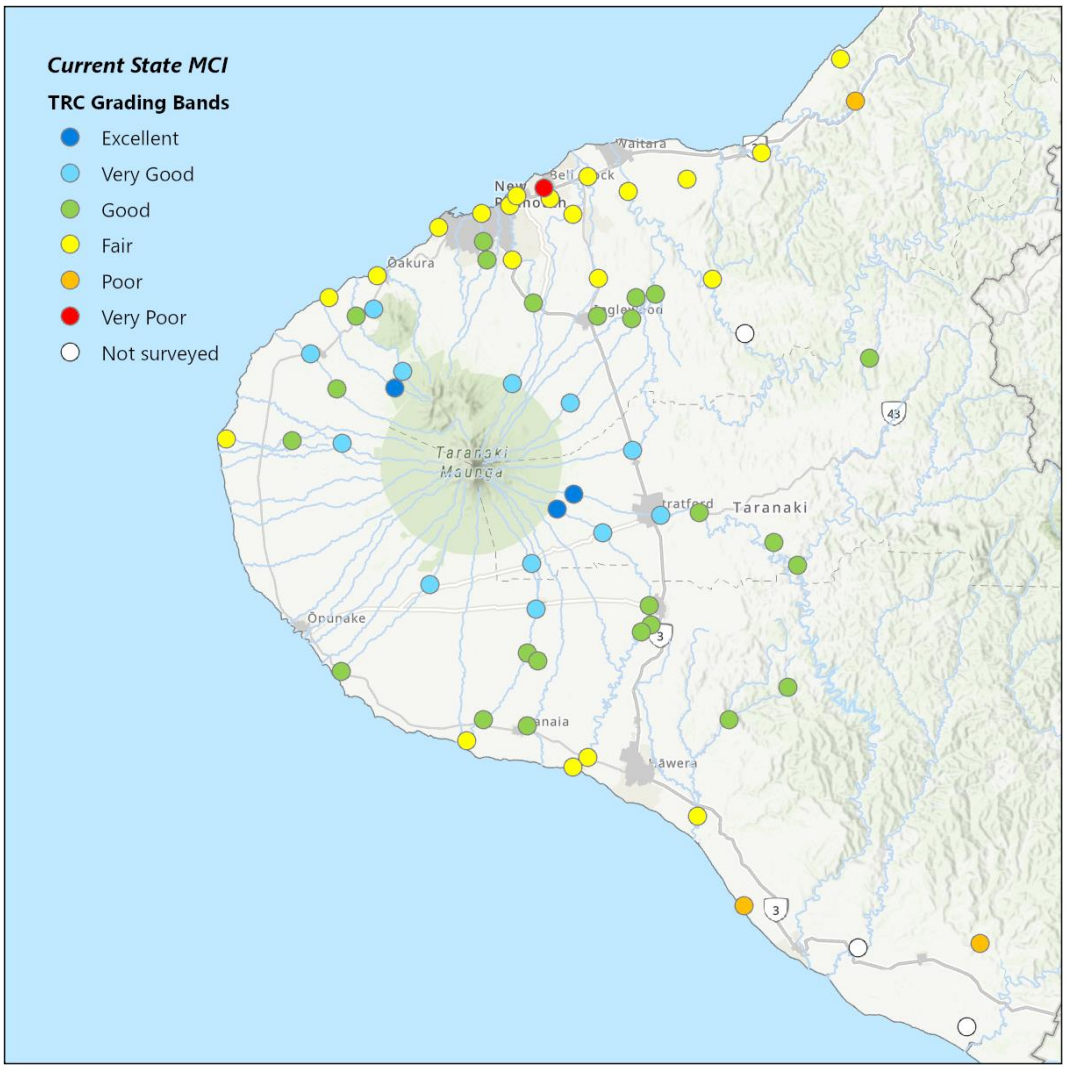


Figure 1 Regionally-derived MCI grades for the 67 macroinvertebrate sites monitored in the Taranaki region during the 2022/23 monitoring year.

13. In addition to reporting on state, a summary of the full 28 years (long-term) and the latest ten years (short-term) of data was provided to assess trends over time.
    - For long-term trends, 42 out of 56 (75%) sites had improving trends, while eight sites (14%) degraded. The remaining six sites (11%) were indeterminate (Figure 2).
    - In contrast, short-term trends for the monitoring period of 2013 to 2023 were quite different, and indicated only 20 sites (34.5%) had improving trends, while 18 sites (31%) had degrading trends. The remaining 20 sites (34.5%) were indeterminate (Figure 3).
14. When comparing the long-term and short-term datasets, the short-term trends had a more even distribution of positive, negative and indeterminate trends, with there now being over twice the amount of degrading sites than shown in the long-term trends. Typically, the sites which had healthy in-stream communities at the start of the monitoring programme have not shown large improvements in trend analyses, while sites with long-term trends showing the highest improvements were in relatively 'poor' health at the start of the monitoring programme.

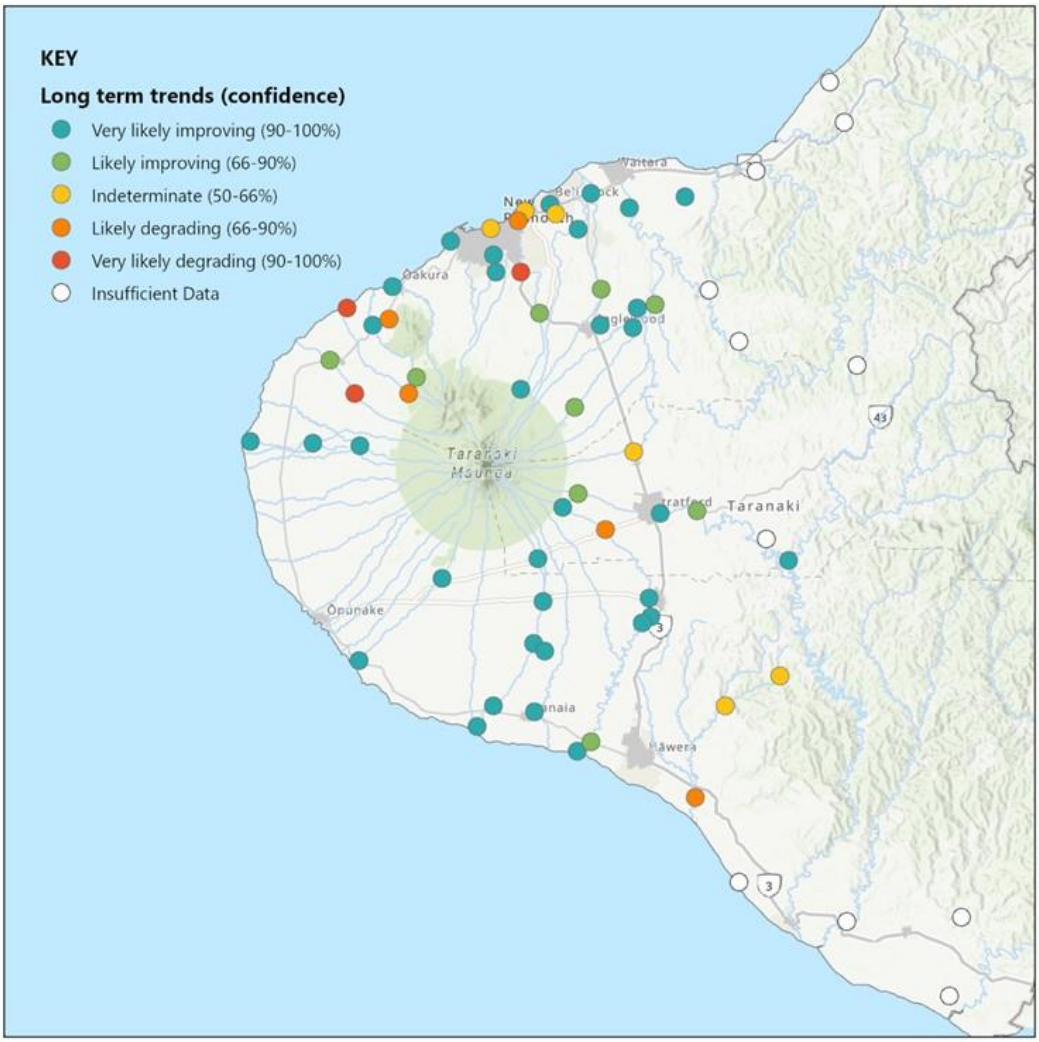


Figure 2 Long-term trends for sites in the SoE macroinvertebrate monitoring programme (1 July 1995 – 30 June 2023).

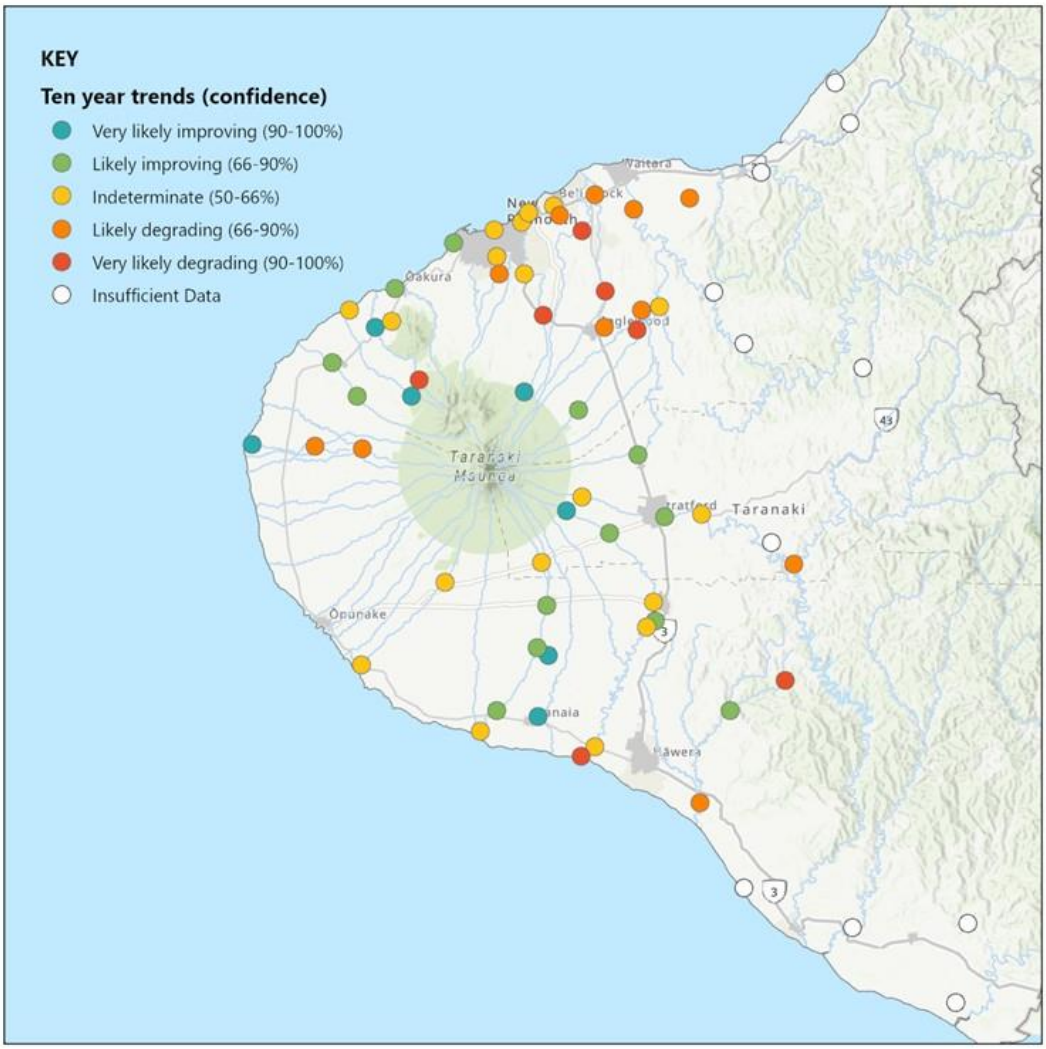


Figure 3 Short-term trends for sites in the SoE macroinvertebrate monitoring programme (1 July 2013 – 30 June 2023).

15. An analysis comparing the data to NPS-FM NOF attributes showed the following results (summarised below in Table 1):

- For MCI, 52 of the 67 sites (78%) reported five-year median scores above the national bottom line (≥90), with 15 sites (22%) falling below this threshold, indicating severe organic pollution or nutrient enrichment. Most sites (29, or 43%) were in band C, suggesting moderate pollution, while 12 sites (18%) were in band A, indicating pristine conditions.
- For SQMCI, 41 sites (61%) had median scores above the national bottom line (≥4.5), and 26 sites (39%) were below, reflecting severe pollution. The distribution was more evenly distributed across bands compared to MCI. There were 18 sites (27%) in band A, the highest proportion among the three metrics.
- For ASPM, 59 sites (88%) reported scores above the national bottom line (≥0.3), while 8 sites (12%) were below. Most sites (34, or 51%) fell within band B, suggesting mild pollution, with only 9 sites (13%) in band A, indicating the lowest proportion of pristine conditions among the metrics assessed.

Table 1 Total sites within each NOF band for macroinvertebrate attributes using 5-year medians scores calculated from the latest five summer results

NOF BAND	MCI		SQMCI		ASPM	
	Sites	%	Sites	%	Sites	%
A	12	18%	18	27%	9	13%
B	11	16%	9	13%	34	51%
C	29	43%	14	21%	16	24%
D	15	22%	26	39%	8	12%

16. Overall, all three NPS-FM metrics show that water quality is higher within or near the boundary of Te Papa-Kura-o-Taranaki and decreases with distance from it. Band A sites are concentrated within or around the boundary for all metrics. Both MCI and ASPM showed similar patterns of distribution, with ASPM having smaller pockets of poor quality band D sites. The SQMCI attribute had the most pronounced indication of poor water quality.
17. The report sets out a number of recommendations to consider, including:
    - Monitoring of additional sites to increase representation of currently underrepresented FMUs or catchment types. Where appropriate, any potential site changes will be discussed with iwi/hapū and/or catchment community groups to explore opportunities to incorporate other data streams and/or align monitoring programmes.
    - To inform policy implementation and future SoE reporting, it is recommended an analysis of drivers of macroinvertebrate health be undertaken.
    - Undertaking a comparison between regionally- and nationally-derived tolerance values and MCI scores in order to assess similarities between results.

Financial considerations—LTP/Annual Plan

18. This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

19. This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Local Government Official Information and Meetings Act 1987.

Iwi considerations

20. This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the Local Government Act 2002) as outlined in the adopted Long-Term Plan and/or Annual Plan.
21. Through recent engagement with iwi/hapū via freshwater consultation hui, we identified a number of opportunities for collaboration in respect to freshwater monitoring. Further kōrero around these opportunities will be pursued with iwi/hapū in coming months.

Community considerations

22. This memorandum and the associated recommendations have considered the views of the community, interested and affected parties and those views have been recognised in the preparation of this memorandum.

Legal considerations

23. This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices/Attachments

Document 3301355: Freshwater Macroinvertebrate State of the Environment Monitoring Report 2019-2023, Technical report 2024-89.

Freshwater Macroinvertebrate State of the Environment Monitoring Report 2019-2023

Technical Report 24-89

Working with people | caring for Taranaki

Taranaki Regional Council

Freshwater Macroinvertebrate State of the Environment Monitoring Report 2019-2023

Technical Report 24-89

Taranaki Regional Council
Private Bag 713
Stratford

ISSN: 1178-1467 (Online)
Document: 3300198 (Word)
Document: 3301355 (Pdf)
September 2024

Executive summary

Benthic macroinvertebrates are aquatic species that play a crucial role in freshwater ecology. They respond to environmental variables including water quality, hydrology, and habitat, and are used worldwide as sub-indicators of stream health as they respond to human pressures, are taxonomically diverse, and are easy to sample.

Taranaki Regional Council (the Council) established its State of the Environment (SoE) monitoring programme in 1995, with the overall aim being to report on state and trends in freshwater health, to inform the development of RMA policies and to support the region's freshwater ecosystems. This programme is made up of a number of individual monitoring activities, many of which are undertaken and managed on an annual basis. Prior to 2022/23, macroinvertebrate fauna surveys were undertaken in spring (October to December) and summer (February to May). Since that time, surveys have been taken once a year during summer (February to May), following recommendations from the previous annual report. The methodology has remained relatively unchanged over time, and there are currently 67 sites monitored throughout 35 rivers and streams across the Taranaki region.

This annual report includes an assessment of Council's macroinvertebrate data against attributes set out in the *National Policy Statement for Freshwater Management 2020* (NPS-FM) in addition to an assessment against regionally-derived tolerance values and bands for Macroinvertebrate Community Index (MCI). This report therefore covers national macroinvertebrate tolerance values as well as National Objective Framework (NOF) bands for MCI, Semi-Quantitative MCI (SQMCI) and Average Score Per Metric (ASPM), with the inclusion of new data from the four monitoring years spanning 2019 to 2023. The report comprises three main sections: a regional state analysis of taxa richness and MCI scores using traditional regionally-derived scores and bands; a national state analysis of MCI, SQMCI, and ASPM using nationally-derived five-year medians and bands as required by the NPS-FM, and; a regional trend analysis of MCI scores using traditional regionally-derived scores.

The most recent monitoring year (2022/23), was assessed using regionally-derived MCI scores. Three sites (5%) were categorised as having 'excellent' health, 12 sites (19%) were categorised as having 'very good' health, 24 sites (37%) were categorised as having 'good' health, 21 sites (33%) were categorised as having 'fair' health, three sites (5%) were categorised as having 'poor' health, and one site (1%) was categorised as having 'very poor' health. Two new maximum scores and one new minimum were recorded.

The results indicated a gradual decline in macroinvertebrate community health in a downstream direction. Sites classified as 'excellent' are predominantly located near or within the boundaries of Te Papa-Kura-o-Taranaki, whereas sites scoring 'fair' or lower are closer to the coast. Enhancing stream health, especially at sites in the lower reaches of ring plain streams, is unlikely to be significant or meaningful without substantial improvements in habitat and water quality. Such improvements involve initiatives such as riparian fencing/planting and redirecting discharges from dairy pond treatment systems away from direct surface water disposal to land irrigation.

Analysis comparing data to NPS-FM NOF attributes showed that 52 of the 67 sites (78%) reported five-year median MCI scores above the national bottom line (≥90), with 15 sites (22%) falling below this threshold, indicating severe organic pollution or nutrient enrichment. Most sites (29, or 43%) were in band C, suggesting moderate pollution, while 12 sites (18%) were in band A, indicating pristine conditions. For SQMCI, 41 sites (61%) had median scores above the national bottom line (≥4.5), and 26 sites (39%) were below, reflecting severe pollution. The distribution was more evenly distributed across bands compared to MCI. There were 18 sites (27%) in band A, the highest proportion among the three metrics. For ASPM, 59 sites (88%) reported scores above the national bottom line (≥0.3), while 8 sites (12%) were below. Most

sites (34, or 51%) fell within band B, suggesting mild pollution, with only 9 sites (13%) in band A, indicating the lowest proportion of pristine conditions among the metrics assessed.

Overall, all three NPS-FM metrics show that water quality is higher within or near the boundary of Te Papa-Kura-o-Taranaki and decreases with distance from it. Band A sites are concentrated within or around the boundary for all metrics. Both MCI and ASPM showed similar patterns of distribution, with ASPM having smaller pockets of poor quality band D sites. The SQMCI attribute had the most pronounced indication of poor water quality.

In addition to reporting on state, a summary of the full 28 years (long-term) and the latest ten years (short-term) of data is provided to assess trends over time. Fifty-six sites had sufficient data (at least 10 years' of monitoring data) to perform a trend analysis. For long-term trends, 42 out of 56 (75%) sites had improving trends, while eight sites (14%) degraded. The remaining six sites were indeterminate. In contrast, short-term trends for the monitoring period of 2013 to 2023 were quite different, and indicated only 20 sites (34.5%) had improving trends, while 18 sites (31%) had degrading trends. The remaining 20 sites (34.5%) were indeterminate. When comparing the long-term and short-term datasets, the short-term trends had a more even distribution of positive, negative and indeterminate trends, with there now being over twice the amount of degrading sites than shown in the long-term trends. Typically, the sites which had healthy in-stream communities at the start of the monitoring programme have not shown large improvements in trend analyses, while sites with long-term trends showing the highest improvements were in relatively 'poor' health at the start of the monitoring programme.

For the 2023/24 monitoring year, the SoE programme will continue its freshwater macroinvertebrate monitoring using the same methods as in 2018/19, with some updates following recommendations including adding new sites to better represent underrepresented FMUs or catchment types (e.g., spring-fed) and reviewing the appropriateness of an existing site on the Uruti Stream. Where appropriate, site changes will be discussed with iwi/hapū, stakeholder and/or catchment community groups to explore additional data integration or alignment with other monitoring efforts. Annual updates on macroinvertebrate data trends will be maintained, and further analysis of the factors affecting macroinvertebrate health will be conducted to support policy and SoE reporting. Additionally, a comparison of regionally and nationally derived tolerance values and MCI scores will be performed to evaluate result similarities.

Table of contents

List of tables

List of figures

1. Introduction

1.1 Background

Benthic (meaning "bottom-dwelling") macroinvertebrates encompass a diverse range of aquatic species that play a crucial role in freshwater ecology. They include small aquatic animals such as worms and crayfish (kōura) and the aquatic larval stages of insects such as mayflies, stoneflies, and caddisflies. Macroinvertebrates are found in and around water bodies, attaching themselves to rocks, vegetation, logs and sticks or burrowed into the bottom sand and sediments. Macroinvertebrates play integral roles in stream food webs, and their dynamics are shaped by physical, chemical, and biological conditions of the stream. They feed on organic matter such as periphyton, plants and macrophytes, debris, and each other. Additionally, they serve as important in-stream food sources for fish and wading birds. Macroinvertebrates in their larval stage will emerge from the water as adults, becoming food for terrestrial animals like birds, bats, and spiders.

Macroinvertebrates are recognised globally as sub-indicators of stream ecosystem health due to their diverse taxonomy, responsiveness to human impacts, and ease of sampling. Derived from community composition, macroinvertebrate indices effectively reflect the impacts of multiple stressors, serving as reliable indicators of overall stream ecosystem condition (Clapcott et al., 2017). They respond sensitively to changes in water quality, flow regime, habitat structure, and invasive species, making them capable of highlighting upstream stressors like habitat degradation or pollution (NEMS, 2022). For instance, discharge of effluent into a stream can diminish populations of sensitive taxa while potentially increasing those tolerant to such stressors.

Physico-chemical and biological monitoring are both critical for comprehensive freshwater management, and they offer complimentary insights into river health. Water quality monitoring measures physical and chemical parameters such as temperature, pH, and nutrient levels, and provides immediate data on the conditions of a water body. In contrast, biological monitoring assesses the health of aquatic communities such as macroinvertebrates, and reflects the cumulative effects of these conditions over time. By combining both approaches, the Council can gain a fuller understanding of how chemical changes impact the ecosystem, track long-term trends, and make informed decisions about resource management and impacts on freshwater.

1.2 General

The *Resource Management Act 1991* (RMA) has established requirements for local authorities to undertake environmental monitoring. Section 35 of the RMA requires local authorities to monitor, among other things, the state of the environment of their region or district, to the extent that is appropriate to enable them to effectively carry out their functions under the Act.

To this effect, Taranaki Regional Council (the Council) has established a state of the environment monitoring (SoE) programme for the region. This programme is outlined in the Council's 'State of the Environment Monitoring Procedures Document', which was prepared in 1997. The monitoring programme is based on the significant resource management issues that were identified in the *Council's Regional Policy Statement for Taranaki 1994*. The overall aim being to report on the state and trends of freshwater health to enhance the effectiveness of RMA policies and to support the region's freshwater ecosystems.

The SoE programme is made up of a number of individual monitoring activities, many of which are undertaken and managed on an annual basis (from 1 July to 30 June). For these monitoring activities, summary reports are produced to summarise regional environmental monitoring in relation to state and

trends. SoE reports also act as 'building blocks' towards the preparation of the regional state of the environment report every five years.

Traditionally, the Council has only reported on macroinvertebrate fauna using regionally-derived macroinvertebrate tolerance values for the calculations of the Macroinvertebrate Community Index (MCI) as well as regional bands and grading systems from these calculations (Taranaki Regional Council, 1997b). More recently, the Government's *National Policy Statement for Freshwater Management 2020* (NPS-FM) has made it compulsory for every regional council to monitor and report on stream health using various freshwater macroinvertebrate metrics. This report has been updated to incorporate these national standards, transitioning from using only regionally-derived tolerance values and bands for MCI calculations to include national macroinvertebrate tolerance values and National Objective Framework (NOF) bands for MCI, Semi-Quantitative MCI (SQMCI) and Average Score Per Metric (ASPM), using methodology suggested by the NPS-FM. These changes and additions are reiterated throughout the remaining sections of this report when necessary, but are summarised in the methodology.

This report summarises the results from 28 years of macroinvertebrate monitoring data up until June 2023, but will primarily focus on four monitoring years between July 2019 and June 2023, which covers the data period since the previous SoE macroinvertebrates report. This report has three main sections:

1. Regional State: assessing the current health of macroinvertebrate communities using the traditional regionally-derived score and band system using taxa richness and MCI;
2. National State: assessing the current state of macroinvertebrate communities using nationally-derived tolerance values and NOF bands using five-year medians for three attributes (macroinvertebrate community composition (MCI), semi-quantitative macroinvertebrate community index (SQMCI), and average score per metric (ASPM)), as suggested by the NPS-FM, and;
3. Regional Trend: identifying the long-term (28 years) and short-term (10 years) MCI trends using regionally-derived tolerance values to determine if macroinvertebrate health is improving or degrading at the monitored sites.

3

2. Monitoring methodology

2.1 Program design

Macroinvertebrates have been monitored annually under the SoE programme (from 1 July to 30 June) since the programme was initiated in 1995, with the methodology remaining largely unchanged over the years. The 2023 monitoring year marked the twenty-eighth consecutive year of this programme. Traditionally, monitoring surveys were conducted twice annually, once during spring (October to December) and again during summer (February to May). However, a recent review of the macroinvertebrate SoE programme concluded that reducing sampling frequency to once a year during summer (February to May) was appropriate (D. Sutherland, personal communication). This report includes both spring and summer results for the 2019/20 to 2021/22 monitoring periods, while presenting only summer results for the 2022/23 monitoring period.

Since its commencement, the programme has seen the inclusion and exclusion of various sites, with a total of 67 sites currently monitored. Most recently, nine new sites across the Eastern Hill Country and Coastal Terrace areas were added to fulfil the NPS-FM requirement of representative monitoring across all Freshwater Management Units (FMUs) within the region. Additionally, one site in the Mangawhero Stream was removed based on recommendations from the previous 2018/19 SoE Annual Report. This decision was made due to the site's poor habitat conditions, which did not accurately represent the stream's water quality or its catchment.

Due to the extensive duration of the data record and consistent methodology employed throughout the programme's history, it has accumulated statistically complete and robust data. Moreover, the dataset's length enables reliable detection of long-term trends. The methodology for the programme is comprehensively detailed in Taranaki Regional Council (1997b) and summarised below. Results will continue to be reported on a river/stream basis, with regional and national analyses presented separately to avoid confusion due to differences in methodology. This approach allows for the retention of Council-based indices and trend analyses for the full dataset while ensuring compliance with recent NPS-FM standards. Further details of these analyses can be found in the Environmental Parameters section.

The integration of the physico-chemical monitoring programme with the biological monitoring programme helps provide a more comprehensive assessment of freshwater health, as the physico-chemical data can be useful for interpreting biological monitoring results. These additional data help to establish the environmental conditions that may have influenced the presence, abundance, and overall state of macroinvertebrate communities, allowing for a more accurate assessment of the ecological health of each site. By aligning monitoring programmes, we ensure a better understanding of freshwater ecosystems in the region, where changes in water quality can be directly correlated to biological response, thereby enhancing the effectiveness of management strategies.

2.1.1 Site locations

All 67 sites in the freshwater biological SoE programme for the Taranaki region are described in Table 1 and illustrated in Figure 1. A history of site selection can be found in Appendix 1.

Note: Table is ordered in alphabetical order by site code, and rivers/streams with multiple sites are listed from upstream to downstream

Table 1 Freshwater biological monitoring sites in the State of the Environment Monitoring programme

River/stream	Site	Site code	River Environment Classification (REC) class[1]	GPS location	
				E	N
Herekawe Stream	Centennial Drive	HRK000085	WW/L/VA/U/MO/MG	1688283	5674972
Huatoki Stream	Hadley Drive	HTK000350	WX/L/VA/P/MO/LG	1693349	5671486
	Huatoki Domain	HTK000425	WW/L/VA/P/MO/LG	1693041	5673404
	Molesworth St	HTK000745	WW/L/VA/U/MO/MG	1692800	5676424
Kapoaiaia Stream	Wiremu Road	KPA000250	CX/H/VA/P/MO/MG	1678009	5652025
	Wataroa Road	KPA000700	CX/H/VA/P/MO/MG	1672739	5652272
	Cape Egmont	KPA000950	CX/L/VA/P/MO/LG	1665690	5652452
Kaūpokonui River	Opunake Road	KPK000250	CX/H/VA/IF/MO/MG	1698088	5639231
	U/S Kaponga oxi ponds	KPK000500	CX/H/VA/P/MO/MG	1698609	5634423
	U/S Lactose Co.	KPK000660	CX/H/VA/P/MO/LG	1697613	5629791
	Upper Glenn Road	KPK000880	CW/H/VA/P/MO/LG	1693026	5622705
	Near mouth	KPK000990	CW/L/VA/P/HO/LG	1691209	5620444
Kurapete Stream	U/S Inglewood WWTP	KRP000300	WX/L/VA/P/LO/LG	1705087	5665510
	D/S Inglewood WWTP	KRP000660	WW/L/VA/P/LO/LG	1709239	5667481
Katikara Stream	Carrington Road	KTK000150	CW/L/VA/P/HO/LG	1683566	5657855
	Beach	KTK000248	WX/L/VA/P/MO/LG	1676597	5667473
Makara Stream	120m U/S confluence with Waitara River	MAA000900	WW/L/SS/P/MO/MG	1717268	5669453
Mangorei Stream	SH3	MGE000970	CX/L/VA/P/MO/LG	1696094	5671500
Mangaehu River	Raupuha Road	MGH000950	CW/L/SS/P/HO/LG	1726300	5639062
Manganui River	SH3	MGN000195	CX/H/VA/P/MO/LG	1708871	5651282
	Bristol Road	MGN000427	CX/L/VA/P/HO/MG	1711210	5667887
Mangatī Stream	D/S Railway line	MGT000488	WN/L/VA/P/LO/LG	1700095	5678043
	Te Rima Place, Bell Block	MGT000520	WW/L/VA/U/LO/LG	1699385	5679103
Makuri Stream	30m D/S Raupuha Road	MKR000495	WW/L/SS/P/MO/LG	1723795	5641478
Maketawa Stream	Opp Derby Road	MKW000200	CX/H/VA/IF/MO/MG	1702192	5656304
	Tarata Road	MKW000300	CX/H/VA/P/MO/LG	1708784	5665231
Moumahaki Stream	Moumahaki at Johnston Road	MMK000050	WW/L/SS/P/MO/LG	1745684	5598975
Mangaoreti Stream	U/S of Avenue Rd Bridge	MNT000950	WW/L/SS/P/LO/LG	1722557	5682900
Mangaoraka Stream	Corbett Road	MRK000420	WW/L/VA/P/MO/LG	1702538	5676320
Mangaroa Stream	Vanners landfarm, Lower Ball Road	MRO000210	WD/L/VA/P/MO/LG	1720698	5602911

[1] The New Zealand River Environmental Classification (REC) system is a framework used to categorize rivers and river segments based on their physical and environmental characteristics, helping to standardize river management and research by providing a consistent basis for comparison. It provides a context for inventories of river/stream resources and a spatial framework for effects assessment, policy development, developing monitoring programmes, and interpretations of state of the environment reporting.

5

River/stream	Site	Site code	River Environment Classification (REC) class[1]	GPS location	
				E	N
Matau Stream	U/S confluence with unnamed trib.	MTA000068	CW/L/SS/P/LO/MG	1733965	5661062
Mangawhero Stream	D/S Mangawharawhara S	MWH000490	CN/L/VA/P/MO/LG	1710795	5632738
Pātea River	Barclay Road	PAT000200	CX/H/VA/IF/MO/MG	1702620	5646598
	Swansea Road	PAT000315	CX/H/VA/P/MO/LG	1711801	5644382
	Skinner Road	PAT000360	CW/L/VA/P/HO/LG	1715919	5644681
Pūnehu Stream	Wiremu Road	PNH000200	CX/H/YA/IF/MO/MG	1687323	5637020
	SH45	PNH000900	CW/L/VA/P/MO/LG	1677946	5627786
Stony (Hangatahua) River	Mangatete Road	STY000300	CX/H/VA/S/MO/MG	1677460	5657823
	SH45	STY000400	CX/H/VA/S/MO/MG	1674632	5661558
Timaru Stream	Carrington Road	TMR000150	CX/H/VA/IF/LO/HG	1684423	5659634
	SH45	TMR000375	CX/L/VA/P/MO/MG	1679509	5665554
Tāngāhoe River	Upper Valley	TNH000090	WW/L/SS/P/MO/LG	1725340	5626101
	Tangahoe Vly Rd bridge	TNH000200	WW/L/SS/P/HO/LG	1719126	5622681
	D/S rail bridge	TNH000515	WW/L/SS/P/HO/LG	1715751	5612470
Uruti River	SH3 Bridge	URU000198	WW/L/SS/P/MO/LG	1732463	5688339
Waiau Stream	Inland North Road	WAI000110	WW/L/VA/P/MO/LG	1714587	5680018
Waiau Stream (2)	Approx 1.2 km U/S of Hawkin Road	WIU000700	WD/L/VA/P/MO/LG	1744324	5590101
Waiongana Stream	SH3a	WGA000260	CX/L/VA/P/MO/LG	1705159	5669554
	Devon Road	WGA000450	WW/L/VA/P/MO/LG	1704063	5680381
Waingongoro River	700m D/S Nat Park	WGG000115	CX/H/VA/IF/LO/MG	1700835	5645086
	Opunake Road	WGG000150	CX/H/VA/P/LO/MG	1705692	5642523
	Eltham Road	WGG000500	CW/L/VA/P/MO/LG	1710576	5634824
	Stuart Road	WGG000665	CW/L/VA/P/HO/MG	1709784	5632049
	SH45	WGG000895	CW/L/VA/P/HO/LG	1704042	5618667
	Ohawe Beach	WGG000995	CW/L/VA/P/HO/MG	1702531	5617624
Waiwhakaiho River	National Park	WKH000100	CX/H/VA/IF/LO/HG	1696096	5658351
	SH3 (Egmont Village)	WKH000500	CX/H/VA/P/MO/MG	1698297	5666893
	Constance St (NP)	WKH000920	CX/H/VA/P/HO/LG	1695827	5677271
	Adjacent to L Rotomanu	WKH000950	CX/H/VA/P/HO/LG	1696587	5678336
Waiokura Stream	Skeet Road	WKR000500	WW/L/VA/P/MO/LG	1698807	5628892
	Manaia Golf Course	WKR000700	WW/L/VA/P/MO/LG	1697636	5622019
Waimōku Stream	Lucy's Gully	WMK000100	WW/L/VA/P/LO/HG	1681324	5666240
	Beach	WMK000298	WW/L/VA/P/MO/MG	1681725	5669851
Whenuakura River	Nicholson Road	WNR000450	WW/L/SS/P/HO/LG	1732757	5598479
Waikaramarama Stream	Waikaramarama Road - D/S of first bridge	WMR000100	WW/L/SS/P/LO/LG	1730866	5692865
Waitara River	Autawa Road	WTR000540	WX/L/SS/P/HO/LG	1720719	5663669
	Mamaku Road	WTR000850	WX/L/SS/P/HO/LG	1708384	5678739

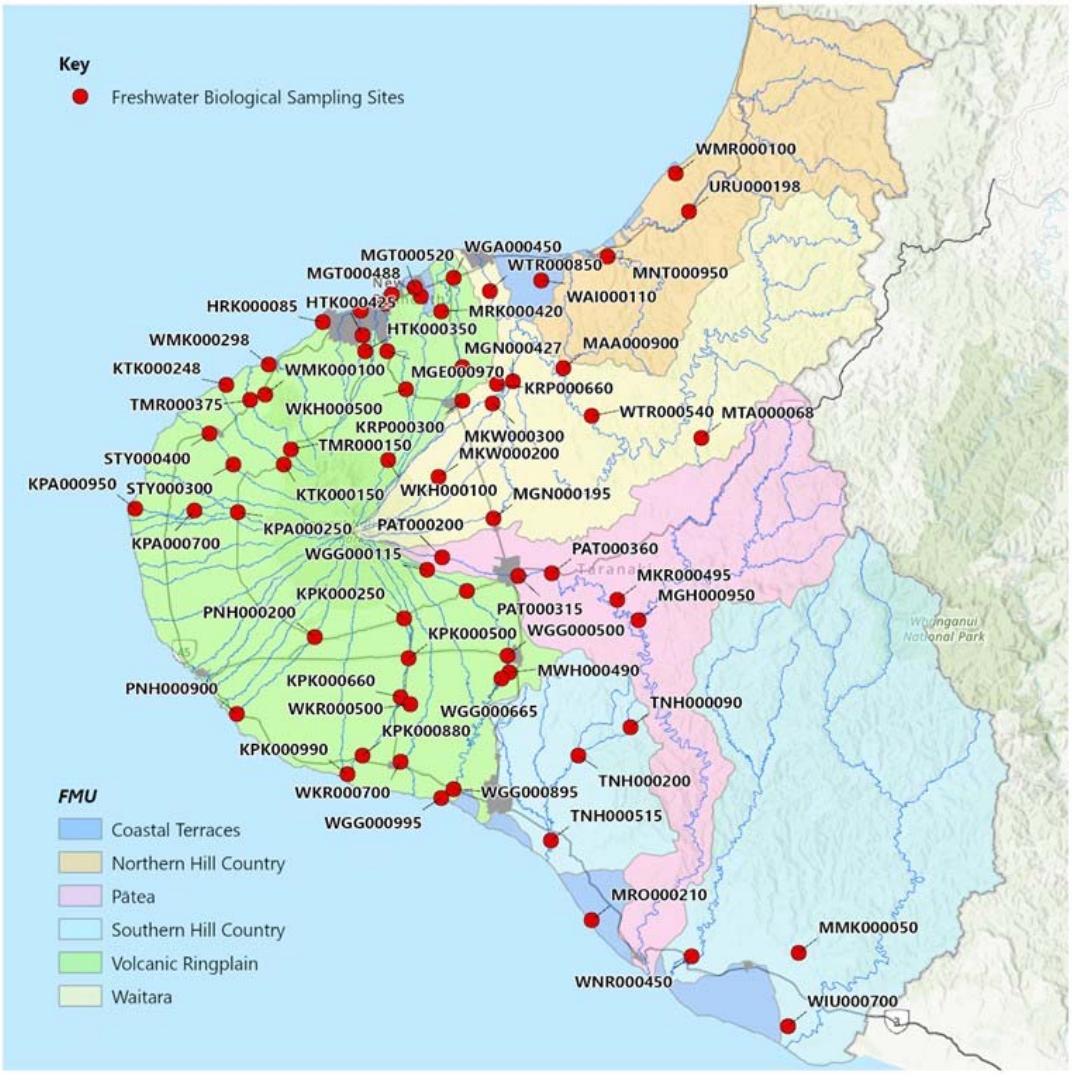


Figure 1 Freshwater biological monitoring sites in the State of the Environment Monitoring

Note: Freshwater Management Units (FMUs) are yet to be finalized and are subject to adoption of the Land and Water Plan

2.2 Sample collection and analysis

The standard '400ml kick-sampling' and occasionally the '400ml vegetation-sweep sampling' techniques were used to collect benthic (bottom-dwelling) macroinvertebrates from various sampling sites in selected catchments in the Taranaki region (Taranaki Regional Council, 1997b). The 'kick-sampling' and 'vegetation-sweep' sampling techniques are very similar to Protocols C1 (hard-bottomed, semi-quantitative) and C2 (soft-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al., 2001).

Samples were preserved with ethanol for later sorting and identification. This was carried out using a stereomicroscope, using protocols P1 (coded-abundance) and P2 (fixed-200) of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark et al., 2001). In addition to a fixed 200 count, macroinvertebrate taxa were placed in abundance categories for each sample (Table 2).

Table 2 Macroinvertebrate abundance categories

Abundance category	Number of individuals
R (rare)	1-4
C (common)	5-19
A (abundant)	20-99
VA (very abundant)	100-499
XA (extremely abundant)	500+

2.2.1 Environmental parameters and indicators

2.2.1.1 Taxonomic richness

The number of macroinvertebrate taxa identified in each sample serves as an indicator of community richness at each site. It's important to note that high taxonomic richness does not necessarily indicate a pristine or healthy community. Sites with mild nutrient enrichment can often have higher taxonomic richness than pristine sites. Therefore, caution is required when interpreting results solely based on taxonomic richness (Stark and Maxted, 2007). From taxa identification, we can also calculate EPT number and EPT percentage from the taxa richness and macroinvertebrate abundances. EPT stands for Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) which are three pollution sensitive insect orders. For this SoE report, while taxa richness is recorded and reported, it will not be used as an indicator of stream health due to these complexities and variations.

2.2.1.2 Macroinvertebrate Community Index (MCI)

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa are assigned the highest score of 10, while the most 'tolerant' taxa score 1. The MCI value is calculated by averaging the scores obtained from a list of taxa taken from one site, and multiplying by a scaling factor of 20. The MCI assesses the overall sensitivity of macroinvertebrate communities to primarily the effects of nutrient enrichment but has been used to assess a range of other pressures such as hydrological changes, sedimentation, and toxic pollutants. Communities considered more 'sensitive' typically inhabit less polluted waterways.

In all previous SoE macroinvertebrate reports sensitivity scores and bands for certain taxa had been modified in accordance with Taranaki experience (see Taranaki Regional Council, 1997b). Stark (1998) provides statistically significant detectable differences for the protocols used by the Council (10.8 MCI units). For this report, if differences between MCI scores are greater than 11 units, then we consider them to be significantly different (i.e., a downstream site scoring 11 units less than the upstream site may therefore be indicative of a degradation of health downstream). This generic adaption is considered to provide more resolution of stream 'health' as it provides precise upper and lower MCI and SQMCI score bands than the earlier grading classification (Stark and Fowles, 2015). Despite the acknowledgement that the boundaries between gradings may be fuzzy (Stark and Maxted, 2007), these gradings can assist with the assessment of trends in long-term temporal data.

Previously, the Council has only used regionally-derived tolerance values for the calculations of macroinvertebrate indices, as well as regional bands and grading systems from these calculations (see Taranaki Regional Council, 1997b). However, this report also applies the nationally-derived macroinvertebrate tolerance values and National Objective Framework (NOF) bands defined in Stark & Maxted (2007) as suggested by the NPS-FM. The NPS-FM requires sampling between November-April and reporting on five-year medians, rather than single survey scores. To overcome discrepancies with data and

reducing sampling to once annually, the NPS-FM five-year medians were calculated using only summer values from the previous five years, rather than incorporating spring values.

For reporting on five-year medians, NOF attribute bands as described by the NPS-FM were used. It differs from that used in previous reports and that of Stark & Maxted (2007). The Council system modifies Stark & Maxted (2007) by using a six band grading system while the NPS-FM differs from that of Stark & Maxted (2007) by the nomenclature used (e.g., 'band A' instead of 'excellent'), and where the bands sit in relation to MCI scores. The NPS-FM bands are more conservative in that band A is equal to or above 130 MCI units while in Stark and Maxted (2007) the equivalent band would be equal to or above 120. This is important to note that although this report presents results from both a regional and national perspective, the national perspective may not be useful when comparing to previous reports as this could make it appear that the health of a site has deteriorated when in fact it is a change in methodology. Reporting on both bands together aims to lessen any discrepancies. The NPS-FM will require councils to ensure that waterways have a minimum MCI score of 90 units based on the most recent five-year median.

Details of the MCI attribute and bands as described in Taranaki Regional Council (1997b) are described in Table 3, while details of MCI and NOF bands as described in the NPS-FM are described in Table 4.

Table 3 Generic MCI gradation of biological water quality conditions adapted for Taranaki streams and rivers

Council Grading	Council MCI	Colour Code	Stark's classification
Excellent	≥140		Excellent
Very Good	120-139		
Good	100-119		Good
Fair	80-99		Fair
Poor	60-79		Poor
Very Poor	<60		

2.2.1.3 Semi Quantitative MCI (SQMCI)

The NPS-FM requires that QMCI is calculated alongside MCI. Traditionally, the Council uses the semi-quantitative version (SQMCI; Stark 1998 & 1999) which is calculated from the taxa present at each site. The SQMCI is calculated by multiplying each taxon score by a loading factor (related to its abundance), summing these products, and dividing by the sum of the loading factors. The loading factors are 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI is not multiplied by a scaling factor of 20. As a result, its corresponding range of values is 20x lower than MCI. The SQMCI produces very similar values to the QMCI, and can generally be considered analogous to the QMCI in terms of interpreting SQMCI scores in relation to NPS-FM requirements.

In previous SoE reports, SQMCI scores were not reported on in individual site analyses. This is due to Stark & Maxted (2007) considering the MCI to be a more appropriate index for SoE monitoring and discussion. Therefore, in this report, more emphasis has been placed on the MCI in the regional results. However, five-year medians using nationally-derived values has been reported in the national results section, as the NPS-FM requires councils to ensure that waterways have a minimum QMCI score of 4.5 units.

Details of the QMCI numeric attributes as described in the NPS-FM are in Table 4. The SQMCI scores calculated will use the same band and state descriptions.

Table 4 NOF Attribute – Macroinvertebrates (1 of 2). Source: MfE, 2020

Value (and component)	Ecosystem health (aquatic life)	
Freshwater body type	Wadeable rivers	
Attribute unit	Macroinvertebrate Community Index (MCI) score; Quantitative Macroinvertebrate Community Index (QMCI) score	
Attribute band and description	**Numeric attribute states**	
	QMCI	MCI
A Macroinvertebrate community, indicative of pristine conditions with almost no organic pollution or nutrient enrichment.	≥6.5	≥130
B Macroinvertebrate community indicative of mild organic pollution or nutrient enrichment. Largely composed of taxa sensitive to organic pollution/nutrient enrichment.	≥5.5 and <6.5	≥110 and <130
C Macroinvertebrate community indicative of moderate organic pollution or nutrient enrichment. There is a mix of taxa sensitive and insensitive to organic pollution/nutrient enrichment.	≥4.5 and <5.5	≥90 and <110
National bottom line	**4.5**	**90**
D Macroinvertebrate community indicative of severe organic pollution or nutrient enrichment. Communities are largely composed of taxa insensitive to inorganic pollution/nutrient enrichment.	<4.5	<90
MCI and QMCI scores to be determined using annual samples taken between 1 November and 30 April with either fixed counts with at least 200 individuals, or full counts, and with current state calculated as the five-year median score. All sites for which the deposited sediment attribute does not apply, whether because they are in river environment classes shown in Table 25 in Appendix II C or because they require alternate habitat monitoring under clause 3.25 are to use soft sediment sensitivity scores and taxonomic resolution as defined in table A1.1 in Clapcott et al., 2017 Macroinvertebrate metrics for the National Policy Statement for Freshwater Management. Cawthron Institute: Nelson, New Zealand. (see clause 1.8). MCI and QMCI to be assessed using the method defined in Stark JD, and Maxted, JR. 2007 A user guide for the Macroinvertebrate Community Index. Cawthron Institute: Nelson, New Zealand (See Clause 1.8), except for sites for which the deposited sediment attribute does not apply, which require use of the soft-sediment sensitivity scores and taxonomic resolution defined in table A1.1 in Clapcott et al., 2017 Macroinvertebrate metrics for the National Policy Statement for Freshwater Management. Cawthron Institute: Nelson, New Zealand. (see clause 1.8).		

2.2.1.4 Average Score Per Metric (ASPM)

The NPS-FM also requires reporting of ASPM, introducing a third numeric attribute state to assess macroinvertebrate community health. ASPM is a multiple index metric that uses MCI, EPT number and EPT percentage scores (Collier, 2008). EPT stands for Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) which are three pollution sensitive insect orders. ASPM standardises the three metrics by dividing values by the maximum values to obtain a value between 0 and 1. For this report maximum values are those used by the NPS-FM (MCI = 200, EPT number = 29, and EPT percentage = 100) which is derived from Collier (2008). The standardised values are then averaged to produce the ASPM. The NPS-FM requires councils ensure that streams have a minimum ASPM score of 0.3 units.

ASPM is not an attribute calculated using regional tolerance values, and thus will only be included in the national analysis section of this report. Details of the ASPM numeric attribute as described in the NPS-FM are in Table 5.

Table 5 NOF Attribute – Macroinvertebrates (2 of 2). Source: MfE, 2020

Value (and component)	Ecosystem health (aquatic life)
Freshwater body type	Wadeable rivers
Attribute unit	Macroinvertebrate Average Score Per Metric (ASPM)
Attribute band and description	**Numeric attribute states ASPM score**
A Macroinvertebrate communities have high ecological integrity, similar to that expected in reference conditions.	≥0.6
B Macroinvertebrate communities have mild-to-moderate loss of ecological integrity	<0.6 and ≥0.4
C Macroinvertebrate communities have moderate-to severe loss of ecological integrity.	<0.4 and ≥0.3
National bottom line	**0.3**
D Macroinvertebrate communities have severe loss of ecological integrity.	<0.3
ASPM scores to be determined using annual samples taken between 1 November and 30 April with either fixed counts with at least 200 individuals, or full counts, and with current state calculated as the five-year median score. All sites for which the deposited sediment attribute does not apply, whether because they are in river environment classes shown in Table 25 in Appendix II C or because they require alternate habitat monitoring under clause 3.25, are to use soft-sediment sensitivity scores and taxonomic resolution as defined in table A1.1 in Clapcott et al., 2017. Macroinvertebrate metrics for the National Policy Statement for Freshwater Management. Cawthron Institute: Nelson, New Zealand. (see clause 1.8) When normalising scores for the ASPM, use the following minimums and maximums: %EPT-abundance (0-100), EPT-richness (0-29), MCI (0-200) using the method of Kevin J Collier (2008). Average score per metric: An alternative metric aggregation method for assessing wadeable stream health. New Zealand Journal of Marine and Freshwater Research, 42:4, 367-378, DOI: 10.1080/00288330809509965. (see clause 1.8)	

2.2.1.5 Predictive measures using the MCI

In previous SoE reports, measured MCI values were compared against two separate predictive models.

The first predictive model applied data from ring plain rivers and streams where the source of flow was within Te Papa-Kura-o-Taranaki. The intention being to establish an expected relationship between MCI scores and distance from stream/river source (Te Papa-Kura-o-Taranaki boundary) for sites on the ring plain. A generic relationship for predicting MCI in ring plain streams/rivers was established as:

$$MCI = 131.717 - 25.825 \log_{10} D \quad \text{[where D = distance from source (km)]}$$

This was based upon more than 2400 Council surveys of about 300 ring plain 'control' sites over the period from 1980 to 2008. This generic predictive relationship has a margin of error of ±10 units (Stark and Fowles, 2009).

The second predictive model used data from Leathwick (personal communication, 2009) which developed predictive scores based upon the River Environmental Classification (REC) system for New Zealand rivers and streams (Snelder et al., 2004). REC classifies and maps river and stream environments in a spatial framework for management purposes. It provides a context for inventories of river/stream resources and a spatial framework for effects assessment, policy development, developing monitoring programmes, and interpretations of state of the environment reporting.

In this report, the Council has chosen to not compare the 2022/23 results against these predictive scores directly within the main body of the document, as the primary scope of this report is to present and analyse data to report on state and trends. However, the Council recognises the value of these scores to provide a

more comprehensive understanding of how the current state may compare to these predictive scores, therefore a table of both predictive scores (if applicable) alongside the most recent regionally-derived MCI results from 2022/23 monitoring year can be found in Appendix II.

2.3 Flows

Hydrological flow recorders continuously monitor water levels in the Mangaoraka, Waiongana, Pūnehu, Kapoaiaia, Waiokura Streams, and the Waiwhakaiho, Manganui, Pātea, Mangaehu, Waingongoro, Kaūpokonui, Waitara, and Whenuakura Rivers. The proximity of previous freshes (elevated flows), along with the temperature at the time of sampling for each site surveyed are summarised in Appendix III, with flow assessments extrapolated from nearby catchments for sites where flow recorders did not exist.

For SoE purposes, flow protocols prevent sampling within seven days after a three times median fresh or ten days after a seven times median fresh, as higher flows disturb community composition and abundance. Other environmental data collected included temperature, periphyton, moss, leaves, woody debris, macrophytes, substrate, erosion, and degree of shading.

2.4 Trend analysis

An important use of long-term monitoring is being able to detect the health of streams and whether conditions have deteriorated, improved, or remained the same over time. The MCI index is an appropriate and easily understood measure of stream health, and was deemed as the most appropriate for the assessment of site health over time (Stark and Maxted, 2007).

In previous SoE reports, time trends were analysed using a traditional Null-Hypothesis Significance Testing (NHST) approach which reported p-values and false-discovery rates. In this report, the time trend analysis has been altered to meet best practise, which moves away from this traditional analysis and instead follows the Trends Direction Assessment (TDA) method of McBride (2019). This change provides a small shift in analysis and reporting of results, however favours a continuous measure using confidence in trend direction. This change addresses the null-hypothesis conflict applied in the NHST and instead assumes that data will always either increase or decrease over time (Snelder et al., 2021).

For this report, regionally-derived MCI scores for the full monitoring (01 July 1995 – 30 June 2023) and previous ten year (01 July 2013 – 30 June 2023) periods were analysed for trends. Sites that did not have at least 10 years of data were excluded from this analysis, as anything with less than 10 years of data does not have sufficient data collected to calculate trends effectively.

In this assessment, trend direction was determined using a Mann-Kendall test, a non-parametric method for assessing the monotonic association between the MCI index and time. The results of this assessment yield valuable information such as annual change (expressed as annual percentage of change), and likelihood/confidence levels. These levels are derived from the Kendall statistic and are used to assign trend directions. It is crucial to note that these confidence levels and resultant trend categories do not reflect the rate of change itself. Some sites may exhibit minor changes but with a high confidence in either improvement or degradation.

For this SoE report the categories have been streamlined into five categories to capture the overall trend, aligning with LAWA trend categories (LAWA, 2023). Trends indicating a likelihood of 90% and 100% are classified as ‘very likely improving’. Those showing a 67% to 90% likelihood are categorized as 'likely improving'. 'Very likely degrading' and 'likely degrading' trends cover the same likelihood ranges, with the category determined by the direction of the slope (positive or negative) calculated in the TDA. A likelihood of 50% to 66% results in a categorisation of ‘indeterminate’, indicating no clear upward or downward trend at the site. These confidence categories are summarised in Table 6.

Note: Reported as likelihood of an improving (increasing), degrading (decreasing), or indeterminate trend. Direction symbols received from LAWA (2023).

Table 6 Confidence categories for trend direction results

Confidence Category	Likelihood range in direction range	
Very Likely Improving	90-100%	
Likely Improving	67–90%	
Indeterminate	50-66%	
Likely Degrading	67–90%	
Very Likely Degrading	90-100%	

Regarding the MCI, an upward trend reflects improvement at a site and a downward trend reflects degradation. To analyse the trend analysis results, the trend direction, confidence/likelihood of that direction being true, and the annual percentage of change must all be taken into account.

It's important to note that the trend analysis methods used here focus solely on identifying monotonic trends and do not investigate causation or correlations with underlying factors driving these trends. Trends observed in the analysis may reflect environmental variations such as rainfall, stream flow, and temperature fluctuations over time. Environmental conditions often show non-monotonic behaviour, influenced by events like floods, which can cause abrupt changes at monitoring sites (Graham et al., 2020). The Council's SoE program for freshwater macroinvertebrates conducted biannual monitoring (in spring and summer) until the 2021/22 period. Consequently, these data may exhibit seasonal patterns. Seasonality was not specifically tested in the data analysed for the TDA, but exploring seasonal variations could potentially offer a more detailed understanding of long-term trends. For detailed spring versus summer analyses, refer to previous annual reports.

3. Results

3.1 Regional state of macroinvertebrate communities (Council values and bands)

The following section will report on taxa richness and regionally-derived MCI scores. Results from the 2019/20, 2020/21, 2021/22, and 2022/23 monitoring years can be found in Table 7 below. MCI scores are coloured according to the grading system described in Table 3.

During the 2019/20 monitoring year, taxa richness across the region ranged from 6-31 taxa, while MCI scores ranged from 58-145 units. During the 2020/21 monitoring year, taxa richness across the region ranged from 5-29 taxa, while MCI scores ranged from 56-151 units. During the 2021/22 monitoring year, taxa richness across the region ranged from 4-30 taxa, while MCI scores ranged from 64-150 units. All periods recorded generally similar ranges.

The results from the 2022/23 monitoring year are illustrated in Figure 2. Additionally, a breakdown of the most recent 2022/23 taxa richness and regionally-derived MCI scores alongside the historical ranges and medians for each site for the entire dataset can be found in Appendix IV.

An individual discussion broken down by river/stream can be found below. Individual site graphs reporting on taxa richness and MCI, as well as recent 2022/23 macroinvertebrate community results for each site are reported in Appendix V.

Note: MCI scores are coloured according to their respective band ranging from 'very poor' to 'excellent'. Data for the 2019/20, 2020/21, and 2021/22 periods are broken down by their spring and summer results. The 2022/23 monitoring year was the first year in which the programme was only sampled once during the summer period. Colour key indicates category of MCI health as described by the Council: excellent (dark blue), very good (light blue), good (green), fair (yellow), poor (orange) and very poor (red). "-" indicates that the sample was not taken during that monitoring period

Table 7 Taxa richness and regionally-derived MCI scores for the reporting period (2019/20 to 2022/23)

River	Site	2019/20				2020/21				2021/22				2022/23	
		MCI		Taxa		MCI		Taxa		MCI		Taxa		MCI	Taxa
		Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Summer	
Herekawe Stream	HRK000085	94	88	17	17	82	93	17	15	95	99	17	19	94	17
Huatoki Stream	HTK000350	104	97	24	22	104	102	22	20	105	101	22	24	101	23
	HTK000425	98	94	22	26	107	104	20	28	108	109	21	20	108	23
	HTK000745	79	66	16	13	91	90	14	20	86	74	14	13	87	17
Kapoaiaia Stream	KPA000250	115	113	24	24	126	110	18	20	119	119	24	19	127	19
	KPA000700	103	100	19	19	92	95	18	23	103	88	18	18	112	18
	KPA000950	90	88	21	16	93	87	15	19	92	96	15	19	95	15
Kaūpokonui River	KPK000250	138	125	24	26	136	127	26	27	140	131	24	22	135	23
	KPK000500	128	115	26	22	126	122	22	26	133	116	21	21	128	21
	KPK000660	117	119	26	14	104	106	18	24	119	104	23	20	109	20
	KPK000880	89	106	13	13	103	91	18	18	101	94	20	14	100	11
	KPK000990	91	89	15	19	102	86	21	21	99	91	19	15	90	12
Kurapete Stream	KRP000300	104	93	17	14	96	96	14	16	92	97	13	13	100	17
	KRP000660	98	94	18	25	94	95	24	22	97	112	21	17	104	20
Katikara Stream	KTK000150	136	134	16	20	151	145	14	19	134	137	17	13	145	20
	KTK000248	98	88	19	16	100	95	22	20	100	105	19	24	94	21
Makara Stream	MAA000900	107	100	11	6	77	106	13	19	91	96	14	15	92	17
Mangorei Stream	MGE000970	105	88	20	18	96	106	22	28	105	97	27	23	93	15
Mangaehu River	MGH000950	97	98	19	10	98	91	17	18	108	90	13	21	104	18
Manganui River	MGN000195	125	134	13	20	121	128	17	24	125	126	16	16	136	16
	MGN000427	107	84	15	18	101	101	25	17	101	96	22	17	110	18
Mangati Stream	MGT000488	85	62	15	12	73	60	17	10	83	72	13	15	84	15

River	Site	2019/20				2020/21				2021/22				2022/23	
		MCI		Taxa		MCI		Taxa		MCI		Taxa		MCI	Taxa
		Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Summer	
	MGT000520	58	69	8	11	56	75	10	11	80	68	9	10	58	8
Makuri Stream	MKR000495	90	93	12	20	104	94	15	17	104	93	17	15	102	22
Maketawa Stream	MKW000200	131	130	28	23	130	129	25	26	131	136	23	15	133	17
	MKW000300	113	97	21	19	109	109	21	21	110	110	21	21	108	22
Moumahaki Stream	MMK000050	-	85	-	13	73	82	19	18	94	89	17	17	78	11
Mangaoreti Stream	MNT000950	-	-	-	-	82	70	10	10	64	65	5	4	80	8
Mangaoraka Stream	MRK000420	96	87	17	27	80	81	14	19	90	92	23	23	93	24
Mangaroa Stream	MRO000210	-	-	-	-	68	84	10	15	-	74	-	10	78	10
Matau Stream	MTA000068	110	104	18	26	103	106	24	21	102	105	21	30	108	20
Mangawhero Stream	MWH000490	89	92	20	18	97	97	19	23	91	91	21	20	101	21
Pātea River	PAT000200	135	128	31	26	136	137	29	27	150	137	21	27	145	27
	PAT000315	121	107	27	24	114	116	21	20	121	126	22	17	120	20
	PAT000360	101	77	21	15	85	89	16	23	102	100	19	24	103	20
Punehu Stream	PNH000200	139	121	21	28	133	129	23	19	138	123	23	19	124	19
	PNH000900	97	98	24	18	98	90	19	16	108	105	20	17	115	17
Stony River	STY000300	113	114	11	13	107	120	9	8	116	110	11	4	108	10
	STY000400	98	105	11	13	120	125	11	11	100	124	13	5	128	5
Timaru Stream	TMR000150	140	136	28	24	143	132	24	21	138	143	23	22	131	23
	TMR000375	110	82	21	18	114	105	22	27	122	117	19	21	116	24
Tangahoe River	TNH000090	102	90	9	26	95	92	22	15	-	93	-	9	114	7
	TNH000200	104	101	14	18	94	103	16	21	116	102	20	12	109	9
	TNH000515	98	86	18	19	95	93	11	24	101	85	19	12	94	16
Uruti Stream	URU000198	96	91	17	21	88	90	21	20	95	91	22	14	77	15
Waiau Stream	WAI000110	90	86	18	19	91	92	22	17	91	86	15	22	97	12
Waiongana Stream	WGA000260	97	83	18	16	110	91	16	22	90	94	21	25	98	20
	WGA000450	104	78	19	20	95	89	16	24	84	96	21	25	88	18

River	Site	2019/20				2020/21				2021/22				2022/23	
		MCI		Taxa		MCI		Taxa		MCI		Taxa		MCI	Taxa
		Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Spring	Summer	Summer	
Waingongoro River	WGG000115	145	137	22	24	143	145	23	22	139	143	21	19	140	26
	WGG000150	122	126	20	25	130	131	21	19	138	139	21	18	127	15
	WGG000500	99	108	20	22	109	104	23	16	106	117	23	18	107	14
	WGG000665	93	101	15	20	96	101	16	22	96	107	20	15	106	16
	WGG000895	95	90	20	22	92	98	22	17	94	95	23	23	98	21
	WGG000995	91	91	26	13	79	94	16	21	83	86	15	27	93	20
Waiau Stream (2)	WIU000700	-	-	-	-	68	70	5	12	71	77	11	12	-	-
Waiwhakaiho River	WKH000100	140	128	22	20	129	140	16	22	138	135	29	19	136	19
	WKH000500	111	102	20	25	80	103	14	19	107	97	23	22	105	19
	WKH000920	105	71	22	13	86	83	21	13	-	103	-	20	98	9
	WKH000950	91	82	18	10	86	78	18	17	99	79	18	19	91	11
Waiokura Stream	WKR000500	108	110	20	18	117	104	21	16	110	108	23	18	117	18
	WKR000700	105	106	16	17	99	98	20	18	109	103	16	15	109	14
Waimoku Stream	WMK000100	124	134	23	16	131	137	27	15	120	131	21	17	133	21
	WMK000298	100	101	19	17	96	94	21	17	115	98	17	11	96	20
Waikaramarama Stream	WMR000100	-	-	-	-	101	100	18	20	95	100	21	27	98	13
Whenuakura River	WNR000450	91	82	19	11	76	91	11	20	86	91	13	14	-	-
Waitara River	WTR000540	100	83	19	8	98	103	12	13	104	95	18	22	-	-
	WTR000850	100	71	13	9	107	87	9	14	80	91	10	17	80	12

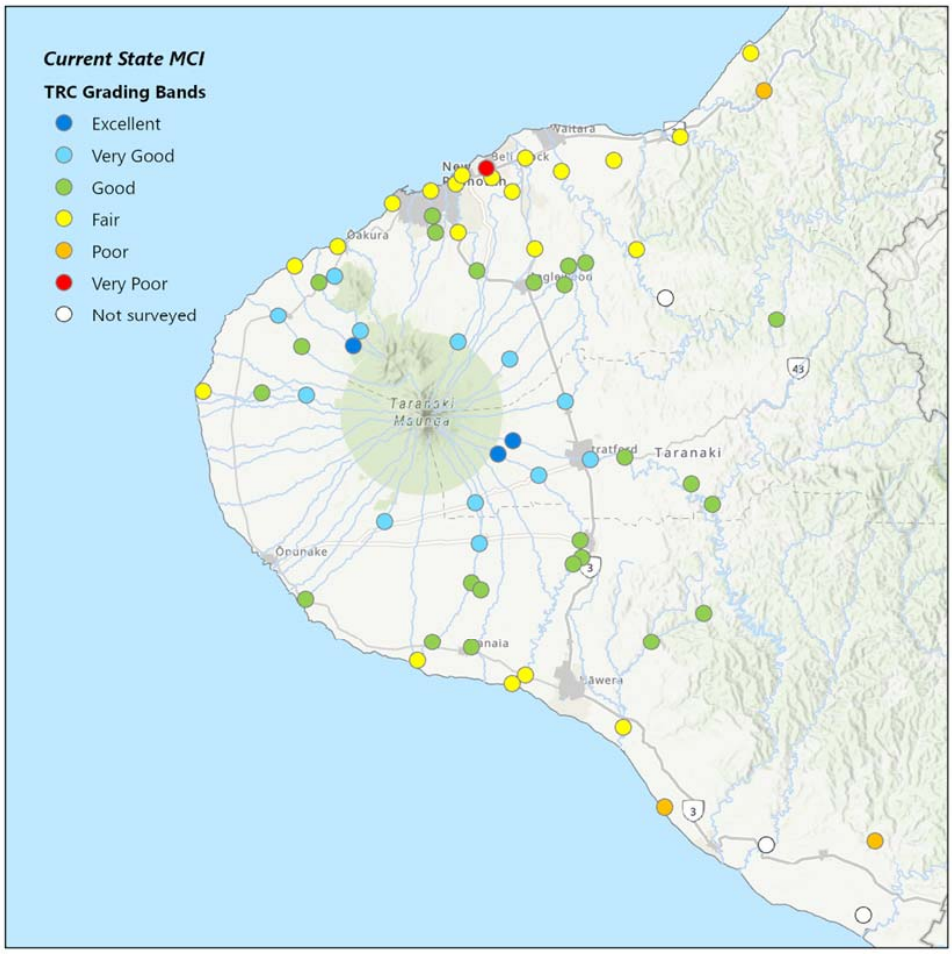


Figure 2 Regionally-derived MCI grades for the 67 macroinvertebrate sites monitored in the Taranaki region during the 2022/23 monitoring year

3.1.1 Individual site results

Herekawe Stream

The Herekawe Stream is a small lowland coastal stream which terminates at Paritūtū Beach on the western perimeter of New Plymouth City. One site is monitored in the lower reaches of the Herekawe Stream. Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 8.

Table 8 Results from SoE surveys performed in the Herekawe Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
HRK000085	31/08/1995	53	13-29	18	68-100	89	17	94	Fair

Since the 2019/20 monitoring period, taxa richness has ranged between 15 and 19 at this site. In the most recent 2023 survey, a moderate taxa richness of 17 was recorded, which is similar to the historical median value and within the range previously recorded throughout all surveys.

Since the 2019/20 monitoring year, MCI scores have ranged between 82 units and 99 units at this site. In the most recent survey, an MCI score of 94 units was recorded at this site. This score categorised this site as having 'fair' macroinvertebrate community health. This score was similar to the historical median.

Huatoki Stream

The Huatoki Stream is a small ringplain stream arising outside Te Papa-Kura-o-Taranaki that flows south to north with the middle and lower parts of the catchment in the New Plymouth city area. There are three SoE sites on this stream. Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 9.

Table 9 Results from SoE surveys performed in the Huatoki Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1996-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
HTK000350	24/12/1996	51	19-34	25	79-115	99	23	101	Good
HTK000425	24/12/1996	51	17-32	25	90-117	104	23	108	Good
HTK000745	24/12/1996	51	11-27	20	56-102	86	17	87	Fair

Since the 2019/20 monitoring year, taxa richness ranged between 20 and 24 taxa at site HTK000350, 20 and 28 taxa at site HTK000425, and 13 and 20 taxa at site HTK000745.

In the most recent 2023 survey, a taxa richness of 23, 23, and 17 was recorded at sites HTK000350, HTK000425, and HTK000754 respectively. All sites recorded less than their respective site medians, however still recorded within the ranges of those recorded previously.

Since the 2019/20 monitoring year, MCI scores ranged from 97 and 105 units at site HTK000350, 94 and 108 units at site HTK000425, and 66 and 91 units at site HTK000745. These ranges have indicated there is usually an overall decrease in health between the upper two sites and the most downstream site.

During the most recent survey, MCI scores of 101 units, 108 units, and 87 units were recorded at sites HTK000350, HTK000425, and HTK000745 respectively. These scores categorised HTK000350 and HTK000425 as having 'good' macroinvertebrate community health, while HTK000745 recorded 'fair' health. This showed a decrease in health in a downstream direction, with the two upstream sites scoring similar to each other, but both significantly higher than the downstream HTK000745 site (by 14 and 21 units respectively). This is a typical pattern of the two upstream sites, as seen by the ranges sitting slightly higher than that of the downstream site. All sites recorded slightly higher MCI scores comparative to historical medians however, not significantly. When comparing results, the two upstream sites had three 'highly sensitive' taxa present while the downstream site recorded only one sensitive taxon. Additionally, the downstream site had less EPT taxa present than the two upstream sites leading to a decrease in MCI score. The significant decrease at the lower site can be attributed to increased urbanisation, habitat modification and subsequent deterioration in water quality.

Kapoaiaia Stream

The Kapoaiaia Stream is a small ringplain stream running in a westerly direction with a source situated inside Te Papa-Kura-o-Taranaki. This stream was selected for the purpose of monitoring a western Taranaki ringplain catchment with minimal existing riparian vegetation cover. Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 10.

Table 10 Results from SoE surveys performed in the Kapoaiaia Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1996-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
KPA000250	23/03/1998	46	18-31	24	83-131	117	19	127	Very Good
KPA000700	10/12/1996	46	12-30	21	78-118	97	18	112	Good
KPA000950	10/12/1996	46	15-25	19	76-101	87	15	95	Fair

Since the 2019/20 monitoring year, taxa richness ranged between 18 and 24 taxa at site KPA000250, 18 and 23 taxa at site KPA000700, and 15 and 21 taxa at site KPA000950.

In the most recent 2023 survey, a taxa richness of 19, 18, and 15 was recorded at sites KPA000250, KPA000700, and KPA000950 respectively. All sites recorded lower taxa richness than historical medians, and were within the lower ranges of what has previously been recorded, with the downstream site KPA000950 recording a taxa richness equal to the lowest recorded for the site to date.

Since the 2019/20 monitoring year, MCI scores ranged between 110 to 126 units at site KPA000250, 88 to 103 units at site KPA000700, and 87 to 96 units at site KPA000950.

In the most recent 2023 survey, MCI scores of 127 units, 112 units, and 95 units were recorded at sites KPA000250, KPA000700, and KPA000950 respectively. These scores categorised site KPA000250 as having 'very good' macroinvertebrate community health, site KPA000700 as having 'good' health, and site KPA000950 as having 'fair' health. This showed a decrease in health in a downstream direction, with each site being significantly lower than the last. This is reflected by the macroinvertebrate community composition, with the upstream site KPA000250 recording seven 'highly sensitive' taxa, while sites KPA000700 and KPA000950 only had five and two of these taxa present respectively. All sites recorded MCI scores which were higher than their respective medians, with the middle site KPA000700 recording a significant higher score (by 15 units).

The deterioration in macroinvertebrate health in a downstream direction is likely due to impacts associated with agriculture as the mid to lower reaches of the stream are in an agriculture dominated catchment.

Kaūpokonui River

The Kaūpokonui River is a ringplain river with its source inside Te Papa-Kura-o-Taranaki which flows in a southerly direction, terminating at Kaūpokonui Beach. Five sites located along the length of the Kaūpokonui River are included in the SoE programme. Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 11.

Table 11 Results from SoE surveys performed in the Kaūpokonui River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
KPK000250	24/03/1998	47	20-36	27	124-140	130	23	135	Very Good
KPK000500	16/02/1996	50	20-33	26	98-138	118	21	128	Very Good
KPK000660	12/12/1995	54	14-32	24	71-128	104	20	109	Good
KPK000880	12/12/1995	54	13-31	18	66-110	91	11	100	Good
KPK000990	19/10/1999	46	11-26	19	69-103	91	12	90	Fair

Since the 2019/20 monitoring year, taxa richness ranged between 22 and 27 taxa at site KPK000250, 21 and 26 taxa at site KPK000500, 14 and 26 taxa at site KPK000660, 13 and 20 taxa at site KPK000880, and 15 and 21 taxa at site KPK000990.

In the most recent 2023 survey, macroinvertebrate taxa richness was low to moderate at the five Kaūpokonui sites, ranging from 11-23 taxa. All sites recorded lower than their respective medians, with site KPK000880 recording the lowest taxa richness for the site to date.

Since the 2019/20 monitoring year, MCI scores ranged between 125-140 units at site KPK000250, 115-133 units at site KPK000500, 104-119 units at site KPK000660, 89-106 units at site KPK000880, and 86-102 units at site KPK000990.

In the most recent 2023 survey, MCI scores of 135 units, 128 units, 109 units, 100 units, and 90 units were recorded at sites KPK000250, KPK000500, KPK000660, KPK000880, and KPK000990 respectively. These scores categorised site KPK000250 and KPK000500 as having 'very good' macroinvertebrate community health, sites KPK000660 and KPK000880 as having 'good' health, while downstream KPK000990 had 'fair' health. All sites scored MCI scores that were similar to or higher than their respective site medians.

MCI scores recorded at the five sites monitored indicated a decrease in health in a downstream direction, with upstream sites KPK000250 and KPK000500 scoring significantly higher than the three downstream sites. Both upstream sites recorded more 'highly sensitive' taxa (10 at KPK000250, seven at KPK000500), with the three downstream sites having less of these taxa present (three at KPK000660, one at KPK000880 and one at KPK000990). The most downstream KPK000990 recorded the lowest MCI of the five sites, but was not significantly lower than the KPK000880 site just 5.4km upstream. This decrease is typical, with the downstream KPK000990 scoring 45 MCI units less than the most upstream KPK000250, which is only located 3.3km from the ringplain of Te Papa-Kura-o-Taranaki.

The general deterioration in macroinvertebrate health is likely due to cumulative inputs from point and diffuse sources in a catchment dominated by agriculture, which also has industrial and urban influence.

Kurapete Stream

The Kurapete Stream is a ringplain seepage-sourced stream running in an easterly direction that flows into the Manganui River, which is itself a tributary of the Waitara River. Two sites, one located immediately upstream of the Inglewood Wastewater Treatment Plant (WWTP) and the other nearly six km downstream, are included in the SoE programme for the purposes of long-term monitoring of the impacts of the removal of the treated wastewater discharge from the stream and also, riparian vegetation planting initiatives in the catchment.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 12.

Table 12 Results from SoE surveys performed in Kurapete Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
KRP000300	05/09/1995	53	12-32	21	80-107	95	17	100	Good
KRP000660	05/09/1995	53	17-30	24	74-112	95	20	104	Good

Since the 2019/20 monitoring year, taxa richness ranged between 13 and 17 taxa at site KRP000300, and 17 and 25 taxa at site KRP000660. In the most recent 2023 survey, a taxa richness of 17 and 20 were recorded at sites KRP000300 and KRP000660 respectively. These numbers were on the lower end compared to the range recorded historically, with both sites recording taxa numbers that were lower than their respective

medians. Since the 2019/20 monitoring year, MCI scores ranged between 92-104 units at site KRP000300, and 94-112 units at site KRP000660.

In the most recent 2023 survey, MCI scores of 100 and 104 units were recorded at sites KRP000300 and KRP000660 respectively and were both reflective of 'good' macroinvertebrate community health. These scores were on the moderate end of the range recorded previously. Both sites scored higher than their respective medians, although not significantly.

Katikara Stream

The Katikara Stream is a ringplain stream running in a westerly direction, which arises within Te Papa-Kura-o-Taranaki. Two sites in the Katikara Stream, one located near the headwaters (just inside the Te Papa-Kura-o-Taranaki boundary) and the other near the coast, were first included in the SoE programme for the purpose of long-term monitoring of the progressive impacts of riparian vegetation planting initiatives within this north-western Taranaki catchment.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 13.

Table 13 Results from SoE surveys performed in the Katikara Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1999-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
KTK000150	27/09/1999	45	11-38	24	112-151	135	20	145	Excellent
KTK000248	26/10/2000	43	16-31	25	80-118	102	21	94	Fair

Since the 2019/20 monitoring year, taxa richness ranged between 13 and 17 taxa at site KRP000300, and 17 and 25 taxa at site KRP000660. In the most recent 2023 survey, a taxa richness of 20 and 21 were recorded at sites KTK000150 and KTK000248 respectively. These numbers were moderate compared to the range recorded historically. Both sites recorded lower than their respective historical medians, but recorded taxa numbers similar to each other.

Since the 2019/20 monitoring year, MCI scores have ranged between 134-151 units at site KTK000150, and 88-105 units at site KTK000248. In the most recent 2023 survey, MCI scores of 145 and 94 units were recorded at sites KTK000150 and KTK000248 respectively. This categorised the upstream site KTK000150 as having 'excellent' macroinvertebrate community health, while the downstream KTK000248 had 'fair' health. This is typical of these sites, due to the upstream sites proximity to Te Papa-Kura-o-Taranaki. There was a significant decrease in a downstream direction of 51 units, however this was typical of that previously recorded, with both sites recording MCI scores within their respective ranges. Site KTK000150 recorded more than its respective median, but not significantly. While site KTK000248 recorded less than its respective median, but again not significantly.

Despite having similar taxa richness, site KTK000150 recorded an 'excellent' macroinvertebrate community score likely due to having ten 'highly sensitive' taxa present, with the downstream KTK000248 recording only two of these taxa. In contrast, site KTK000248 recorded ten 'tolerant' taxa, while the upstream site KTK000150 only recorded two of these taxa, causing the significant difference in MCI scores.

Makara Stream

The Makara Stream is a small eastern hill country stream and a tributary of the Waitara River. One site was established in the 2019/20 monitoring period for the purpose of monitoring an additional site in the Waitara FMU. This is the first time this site has been reported on.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 14.

Table 14 Results from SoE surveys performed in the Makara Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2019-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MAA000900	29/11/2019	6	6-19	14	77-107	98	17	92	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 6-19 taxa. In the most recent 2023 survey, this site recorded a moderate taxa richness of 17, which was slightly higher than the historical median.

Since the 2019/20 monitoring year, MCI scores have ranged between 77-107 units. In the most recent 2023 survey, an MCI score of 92 units was recorded for this site. This categorised the site as having 'fair' macroinvertebrate community health.

Mangorei Stream

The Mangorei Stream is a ringplain stream and a tributary of the Waiwhakaiho River. A site was established in the lower reaches of the Mangorei Stream, near the confluence with the Waiwhakaiho River, for the SoE programme in 2002/03. This was in recognition of the importance of this catchment as the only major inflow to the lower reaches of the Waiwhakaiho River below a significant hydroelectric power scheme, and New Plymouth District Council water supply abstractions.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 15.

Table 15 Results from SoE surveys performed in the Mangorei Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2002-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MGE000970	25/11/2002	39	18-33	26	84-113	102	15	93	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 18-28 taxa at this site. In the most recent 2023 survey, this site recorded a low taxa richness of 15. This result was lower than the median taxa richness of that recorded previously, and was the lowest taxa richness for the site recorded to date.

Since the 2019/20 monitoring year, MCI scores have ranged between 88-106 units. In the most recent 2023 survey, an MCI score of 93 units was recorded, reflecting 'fair' macroinvertebrate community health at the time of the survey. This was on the lower end of that recorded previously, and was lower than the historical median for the site by 9 units.

Mangaehu River

The Mangaehu River is a large eastern hill country river and is a major tributary of the Pātea River. There is one SoE site located on the Mangaehu River not far from its confluence with the Pātea River.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 16.

Table 16 Results from SoE surveys performed in the Mangaehu River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MGH000950	20/10/1995	54	10-26	19	77-108	92	18	104	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 10-21 taxa. In the most recent 2023 survey, this site recorded a moderate taxa richness of 18. This was only slightly lower than the historical median for this site and was typical for this site.

Since the 2019/20 monitoring year, MCI scores ranged between 90-108 units. In the most recent 2023 survey, an MCI score of 104 units was recorded. This categorised the site as having 'good' macroinvertebrate community health at the time of the survey. This was on the higher end of the range recorded previously, and was a significant 12 units higher than the historical median for the site.

Long-term improvements in macroinvertebrate health at the site were likely in relation to an apparent reduction in river bed sedimentation possibly related to fewer severe flood events particularly since 2000 with scores tending to plateau between in 2004 and 2008 before improving steadily again since then. Work has also been undertaken encouraging farmers to stabilise erosion prone hill slopes by planting appropriate vegetation such as poplar.

It is recommended that one site is established upstream of this site for the SoE macroinvertebrates programme. This site is located in the Pātea FMU, which is currently underrepresented in the programme. An additional site further into the Eastern Hill Country and closer to the eastern boundary of the Pātea catchment, would provide an ideal reference site for both the Pātea FMU as well as the Northern Hill Country FMU, as it is difficult to establish safe sites in the Northern Hill Country FMU.

Manganui River

The Manganui River is a ringplain river whose source is inside Te Papa-Kura-o-Taranaki and is a significant tributary of the Waitara River. There are two SoE sites located on the Manganui River, one at its mid reaches and another at its lower reaches.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 17.

Table 17 Results from SoE surveys performed in the Manganui River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MGN000195	20/09/1995	54	9-26	20	106-143	126	16	136	Very Good
MGN000427	20/09/1995	54	14-26	20	77-117	98	18	110	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 13-24 at site MGN000195 and 15-25 at site MGN000427. In the most recent 2023 survey, taxa richness was moderate with upstream site MGN000195 having a taxa richness of 16, while the downstream site MGN000427 recorded a taxa richness of 18. Both sites recorded slightly lower than their respective historical medians, but fell within range of that previously recorded.

Since the 2019/20 monitoring year, MCI scores have ranged between 121-134 units at site MGN000195 and 84-107 units at site MGN000427. In the most recent 2023 survey, MCI scores of 136 units and 110 units were recorded at sites MGN000195 and MGN000427 respectively. This categorised the upstream site MGN000195 as having 'very good' health, with the downstream site MGN000427 as having 'good' health.

Both sites recorded MCI scores that were higher than their respective site medians, with the downstream site MGN000427 scoring a significant 12 units more than the historical median. This river showed a decrease in macroinvertebrate community health in a downstream direction, with the downstream site recording an MCI score a significant 26 units less than the upstream site. These sites are 29.2km from one another, with the upstream site being only 8.7km away from the ringplain of Te Papa-Kura-o-Taranaki. This decrease in MCI score can be attributed to the upstream site having seven 'highly sensitive' taxa present and only two 'tolerant' taxa present, while the downstream site only had three 'highly sensitive' taxa present, but five 'tolerant' taxa. The deterioration in macroinvertebrate health is likely due to cumulative inputs from point and diffuse sources in a catchment that is dominated by agriculture.

Mangatī Stream

The Mangatī Stream is a small coastal stream, which flows in a northerly direction through a mix of agriculture, industrial and urban areas. Two sites, located above and below an industrial area, are sampled for SoE purposes.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 18.

Table 18 Results from SoE surveys performed in the Mangati Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MGT000488	21/09/1995	53	9-29	16	56-91	77	15	84	Fair
MGT000520	21/09/1995	53	3-22	10	44-80	68	8	58	Very Poor

Since the 2019/20 monitoring year, taxa richness has ranged between 10-17 taxa at site MGT000488 and 8-11 taxa at site MGT000520. In the most recent 2023 survey, taxa richness between sites was low to moderate with the upstream MGT000488 recording 15 taxa, while the downstream site MGT000520 only recorded eight taxa. Both sites recorded taxa numbers that were slightly lower than their historical medians, but were within range of what has been historically recorded. These results suggested no recent effects of unauthorised discharges, which have historically occurred in this stream.

Since the 2019/20 monitoring year, MCI scores have ranged between 60-85 units at site MGT000488, and 56-80 units at sites MGT000520. In the most recent 2023 survey, MCI scores of 84 units and 58 units were recorded at sites MGT000488 and MGT000520 respectively. This categorised the upstream site as having 'fair' health, while the downstream site had 'very poor' health. Of all sites surveyed during the 2023 monitoring year, site MGT000520 was the only site to have an MCI score reflective of 'very poor' macroinvertebrate community health. The upstream site MGT000488 recorded an MCI score slightly higher than the median, while site MGT000520 recorded slightly lower. Both sites fell into the typical range recorded for these sites. There was a significant decrease in MCI scores of 26 units in a downstream direction. Both sites recorded macroinvertebrate communities of only 'tolerant' and 'moderately sensitive' taxa, with no 'highly sensitive' taxa recorded for this survey. MCI scores were congruent with taxa richness, with both sites having typical scores compared with historical medians.

Makuri Stream

The Makuri Stream is a smaller lowland hill country stream. One site on this stream was added to the SoE programme in the 2019/20 monitoring year for the purpose of monitoring an additional site in the Pātea FMU. This is the first time this site has been reported on.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 19.

Table 19 Results from SoE surveys performed in the Makuri Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2019-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MKR000495	29/11/2019	6	12-20	16	90-104	94	22	102	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 12-20 taxa. In the most recent 2023 survey, a moderate taxa richness of 22 taxa was recorded. This was higher than the median for the site and was the highest taxa richness recorded to date.

Since the 2019/20 monitoring year, MCI scores have ranged between 90-104 units. In the most recent 2023 survey, an MCI score of 102 units was recorded. This categorised the site as having 'good' macroinvertebrate community health. This score was slightly higher than the historical median, and was within the range previously recorded at this site.

Maketawa Stream

The Maketawa Stream is a ringplain stream with its source inside Te Papa-Kura-o-Taranaki. It flows in an easterly direction into the Manganui River. Two sites on the Maketawa Stream were added to the SoE programme in the 2002-2003 monitoring year, in recognition of the fisheries significance of this sub-catchment of the Manganui River catchment.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 20.

Table 20 Results from SoE surveys performed in the Maketawa Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2002-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MKW000200	06/03/1998	44	8-33	23	100-142	129	17	133	Very Good
MKW000300	21/11/2000	43	12-31	21	90-127	109	22	108	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 15-28 taxa at site MKW000200 and 19-21 taxa at site MKW000300. In the most recent survey, taxa richness was moderate with the upstream MKW000200 recording 17 taxa, and the downstream site MKW000300 recording 22 taxa. The upstream MKW000200 site recorded a taxa richness slightly lower than the historical median, while MKW000300 recorded a taxa richness which was slightly higher than the site median. However, both sites recorded taxa richness within the typical range of that previously recorded.

Since the 2019/20 monitoring year, MCI scores have ranged between 129-136 units at site MKW000200 and 97-113 at site MKW000300. In the most recent survey, MCI scores of 133 units and 108 units were recorded at sites MKW000200 and MKW000300 respectively. This categorised the upstream site as having 'very good' health while the downstream site had 'good' health. These scores were similar to their respective site medians, and were typical and within the range that has previously been recorded at these sites. A decrease in macroinvertebrate community health was recorded in a downstream direction, with the downstream site recording an MCI score a significant 25 units less than that recorded at the upstream site. These sites have a distance of 13.2km between locations, with the upstream site only being 2.3km away from the ringplain of Te Papa-Kura-o-Taranaki. Despite the downstream MKW000300 having a higher taxa richness at the time of the survey, a higher number of 'tolerant' taxa were recorded, while the upstream site recorded more 'highly sensitive' taxa. The general deterioration in macroinvertebrate health recorded in the Maketawa Stream is likely due to cumulative inputs from point and diffuse sources in a catchment dominated by agriculture, which also has some industrial and urban influence.

Moumahaki Stream

The Moumahaki Stream is an eastern hill country stream that flows in a southerly direction into the Waitōtara River. One site was established in the 2019/20 monitoring year for the purpose of monitoring an additional site in the Southern Hill country. This is the first time this site has been reported on. Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 21.

Table 21 Results from SoE surveys performed in the Moumahaki Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2020-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MMK000050	20/03/2020	5	13-19	17	73-94	85	11	78	Poor

Since the 2019/20 monitoring year, taxa richness has ranged between 13-19 taxa. In the most recent 2023 survey, taxa richness was low (11 taxa). This was lower than the site median and was the lowest recorded taxa richness to date. Range changes are to be expected while the data set remains limited and with time the data will become more robust.

Since the 2019/20 monitoring year, MCI scores have ranged between 73-94 units at this site. In the most recent 2023 survey, an MCI score of 78 units was recorded. This categorised the site as having 'poor' macroinvertebrate community health. This score was slightly less than the historical median, but was within the range previously recorded. No 'highly sensitive' taxa were recorded at this site during the latest survey, which was reflected by the 'poor' MCI score.

The Moumahaki site is a soft sedimentary site where the substrate composition is largely smaller substrates such as silt and sand. It was noted to have highly unstable bank stability, likely leading to erosion and further sediment deposition, which can negatively impact macroinvertebrate communities.

Mangaoreti Stream

The Mangaoreti is a lowland coastal stream and a tributary of the Urenui River. One site in this river was included in the SoE programme in the 2020/21 monitoring year, for the purpose of monitoring an additional site in the Northern Hill country FMU. This is the first time this site has been reported on.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 22.

Table 22 Results from SoE surveys performed in the Mangaoreti Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2021/22				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MNT000950	18/01/2021	4	4-10	8	64-82	68	8	80	Fair

Since the 2020/21 monitoring year when this site was added, taxa richness has ranged between 4-10 taxa. In the most recent 2023 survey, taxa richness was low, however typical for that recorded previously. A total of eight taxa were recorded in this survey. This taxa richness was equal to the historical median for this site.

Since the 2020/21 monitoring year, MCI scores have ranged between 64-82 units. In the most recent 2023 survey, an MCI score of 80 units was recorded at this site. This categorised this site as having 'fair' macroinvertebrate community health. This score was a significant 12 units higher than the site median, and was on the higher end of the range of that typically recorded at this site.

Mangaoraka Stream

The Mangaoraka Stream is a ringplain stream whose source is outside Te Papa-Kura-o-Taranaki. The stream flows in a northerly direction and is a tributary of the Waiongana Stream where it joins near to the coast.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 23.

Table 23 Results from SoE surveys performed in the Mangaoraka Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MRK000420	19/09/1995	53	11-30	25	75-105	90	24	93	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 14-27 taxa. In the most recent 2023 survey, taxa richness was moderate (24 taxa). This was slightly lower than the median for this site, however was typical for what has previously been recorded.

Since the 2019/20 monitoring year, MCI scores have ranged between 80-96 units. In the most recent 2023 survey, an MCI score of 93 units was recorded at this site. This categorised the site as having 'fair' macroinvertebrate community health. This score was slightly more than the historical median, and was within the range of that previously recorded.

Recently, deteriorating water quality (i.e. increased dissolved reactive phosphorus, total phosphorus, faecal coliforms, enterococci and decreased visual clarity as a measure by black disc) has been recorded at the site (Taranaki Regional Council, 2018). The decline in water quality was due to a large increase in land use activity, namely new poultry farms and a deterioration in stock control, resulting in an overall increase in pollution loads within the catchment.

Mangaroa Stream

The Mangaroa Stream is a lowland coastal stream. One site in this river was included in the SoE programme in the 2020/21 monitoring year, for the purpose of monitoring an additional site in the Coastal Terraces FMU. This is the first time this site has been reported on.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 24.

Table 24 Results from SoE surveys performed in the Mangaroa Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2021/22				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MRO000210	13/01/2021	3	10-15	10	68-84	74	10	78	Poor

Since the 2021 monitoring year when this site was added, taxa richness has ranged from 10-15 taxa. Taxa richness was low at the MRO000210 site, recording 10 taxa in the most recent survey. This was the same as the median for this site, however is sitting at the bottom of the previously recorded range for this site. The majority of taxa present were 'tolerant' taxa, with no EPT taxa present.

Since the 2021 monitoring year, MCI scores have range between 68-84 units. In the most recent 2023 survey, an MCI score of 78 units was recorded at this site. This categorised this site as having 'poor' macroinvertebrate community health. This score was slightly more the historical median, but was typical for the range previously recorded at this site. This lower MCI score is likely due to no 'highly sensitive' taxa being recorded at this site during the latest survey.

Matau Stream

The Matau Stream is an eastern hill country stream. One site was established in the 2019/20 monitoring year due to its proximity to forestry zones and its location within the underrepresented Waitara FMU.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 25.

Table 25 Results from SoE surveys performed in the Matau Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2019-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MTA000068	29/11/2019	6	18-30	23	102-110	105	20	108	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 18-30 taxa at site. In the most recent 2023 survey, this site recorded a moderate taxa richness of 20 taxa. This was slightly lower than the site median.

Since the 2019/20 monitoring year, MCI scores have ranged between 102-110 units. In the most recent 2023 survey, an MCI score of 108 units was recorded at this site. This score was reflective of 'good' macroinvertebrate community health. This score was slightly more than the historical median, but within the range previously recorded at this site.

Mangawhero Stream

The Mangawhero Stream is a small stream that arises as a seepage stream draining the Ngaere swamp, with a lower sub-catchment (Mangawharawhara Stream) rising on the ringplain, but outside of Te Papa-Kura-o-Taranaki. Previously two sites on this stream were monitored as part of the SoE programme; however, following recommendations, the upper site MWH000380 was removed as this site has very poor site-specific habitat and is not considered representative of the stream's water quality or catchment. This is the first report in which MWH000380 is not reported on.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 26.

Table 26 Results from SoE surveys performed in the Mangawhero Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
MWH000490	24/10/1995	54	13-30	20	63-102	83	21	101	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 18-23 taxa. In the most recent 2023 survey, a moderate taxa richness of 21 taxa was recorded. This was slightly more than the median for this site, however was typical for what has previously been recorded.

Since the 2019/20 monitoring year, MCI scores have ranged between 89-97 units. In the most recent 2023 survey, an MCI score of 101 units was recorded at this site. This categorised the site as having 'good' macroinvertebrate community health. This score was a significant 18 units more than the median for the site, and sat in the upper range of that previously recorded.

Improvement in the MCI score was consistent with the diversion of the major point source Eltham municipal wastewater discharge out of the Mangawhero Stream which was completed in June 2010.

Pātea River

The Pātea River is a large, ringplain river that originates within Te Papa-Kura-o-Taranaki and flows in a south-easterly direction. Three SoE sites are located in the upper and middle reaches of the river.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 27.

Table 27 Results from SoE surveys performed in the Pātea River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
PAT000200	11/10/1995	54	21-35	29	127-150	138	27	145	Excellent
PAT000315	11/10/1995	54	17-32	25	99-130	111	20	120	Very Good
PAT000360	11/10/1995	54	15-33	23	77-112	98	20	103	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 21-31 taxa at site PAT000200, 17-27 taxa at site PAT000315, and 15-24 taxa at site PAT000360. In the most recent 2023 survey, a taxa richness of 27, 20, and 20 taxa was recorded at sites PAT000200, PAT000315, and PAT000360 respectively. All sites recorded less than their respective site medians, however were still within the range of that recorded previously.

Since the 2019/20 monitoring year, MCI scores have ranged between 128-150 units at site PAT000200, 107-126 units at site PAT000315, and 77-102 units at site PAT000360. In the most recent 2023 survey, MCI scores of 145 units, 120 units, and 103 units were recorded at sites PAT000200, PAT000315, and PAT000360 respectively. These scores categorised site PAT000200 as having 'excellent' macroinvertebrate community health, site PAT000315 as having 'very good' health, and site PAT000360 as having 'good' health. This showed a decrease in health in a downstream direction, with each site being significantly lower than the last. This can be reflected in community results, with the upstream site PAT000200 having more taxa present, including thirteen 'highly sensitive' taxa, while sites PAT000315 and PAT000360 recorded only five and three 'highly sensitive' taxa respectively. All sites recorded MCI scores that were higher than their respective medians, with the downstream site PAT000360 recording a significantly higher score (by 15 units units). Overall, there was a decrease of 42 MCI units over a 17.3km distance indicating a significant deterioration in macroinvertebrate community health between the upper and lower sites.

Pūnehu Stream

The Pūnehu Stream is a ringplain stream whose source is located within Te Papa-Kura-o-Taranaki and flows in a southerly direction, with its mouth located east of the town of Opunake. There are two SoE sites, one located in the upper middle reaches and the other located in the lower reaches of the Pūnehu Stream.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 28.

Table 28 Results from SoE surveys performed in the Pūnehu Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
PNH000200	11/10/1995	54	18-32	26	104-139	125	19	124	Very Good
PNH000900	11/10/1995	54	10-26	21	70-114	91	17	115	Good

Since the 2019/20 monitoring period, taxa richness ranged between 19-28 taxa at site PNH000200, and 16-24 taxa at site PNH000900. In the most recent 2023 survey, a taxa richness of 19 and 17 were recorded at sites PNH000200 and PNH000900 respectively. Both sites recorded lower than their respective historical medians, but were similar to one another.

Since the 2019/20 monitoring year, MCI scores have ranged between 121-139 units at site PNH000200, and 90-108 units at site PNH000900. In the most recent 2023 survey, MCI scores of 124 units and 115 units were recorded at sites PNH000200 and PNH000900 respectively. This categorised the upstream site PNH000200 as having 'very good' macroinvertebrate community health, while the downstream PNH000900 had 'good' health. There was a decrease in MCI score in a downstream direction, although this was not significant. The upstream site PNH000200 recorded slightly less than the historical median, while the downstream site PNH000900 recorded a significant 24 units more than the historical median, and recorded the highest MCI score to date for this site.

Historically, there have been some compliance issues in regard to consented dairy shed discharges, and the cumulative impacts of such discharges in the Mangatawa Stream sub-catchment in the local vicinity of the lower site (Taranaki Regional Council, 2011 and Fowles, 2014). Changes in macroinvertebrate community structure at the lower site, especially when compared with the upper mid-reach site, reflected issues with nutrient enrichment. However, at least for this survey, there were no significant changes between these sites to suggest nutrient enrichment at this time.

Hangatāhua (Stony) River

The Hangatāhua (Stony) River is a ringplain river whose source is located within Te Papa-Kura-o-Taranaki. The lower part of the river has a very narrow catchment and generally has good water quality. There are two sites monitored for SoE purposes on the Hangatāhua River.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 29.

Table 29 Results from SoE surveys performed in the Hangatāhua (Stony) River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
STY000300	24/10/1995	54	1-21	10	64-140	112	10	108	Good
STY000400	24/10/1995	52	2-18	10	67-150	108	5	128	Very Good

Since the 2019/20 monitoring year, taxa richness has ranged between 4-13 taxa at site STY000300, and 5-13 taxa at site STY000400. In the most recent 2023 survey, taxa richness was low to moderate at both sites, with 10 and five taxa recorded at sites STY000300 and STY000400 respectively. The upstream site STY000300 recorded the same number of taxa as the site median, while the downstream site STY000400 recorded five less taxa. However, both sites recorded numbers of taxa that were within the range typical for these sites. Macroinvertebrate communities in the Hangatāhua River are likely impacted by erosion events that are ongoing within this catchment.

Since the 2019/20 monitoring year, MCI scores have ranged between 107-120 units at site STY000300, and 98-125 units at site STY000400. In the most recent 2023 survey, MCI scores of 108 units and 128 units were recorded at sites STY000300 and STY000400 respectively. This categorised the upstream site STY000300 as having 'good' macroinvertebrate community health, while the downstream site STY000400 had 'very good' health. When comparing to historical medians, the upstream STY000300 scored slightly lower, while the downstream site STY000400 scored an MCI significantly higher than the median (by 20 units).

While it's typical for most rivers to exhibit a decrease in health in a downstream direction, for this survey the Hangatāhua River was the only river in which the sites showed an increase in health in a downstream direction, with the downstream site STY000400 being a significant 20 units more than the upstream site. When investigating further, the two Hangatāhua River sites had extremely similar environmental and temperature data, however the STY000400 site only had five taxa identified compared to ten at the STY000300 site. All five taxa were EPT taxa, which is likely to have increased the MCI value for this site, causing it to be significantly higher than the upstream STY000300 site. One possibility for is that frequent headwater erosion events in the Hangatāhua River, as noted in previous SoE annual reports and Appendix 1, may significantly impact taxa richness and index calculations in the upper catchment. These erosion events introduce large amounts of suspended solids, which can disrupt the habitat and reduce the diversity of aquatic organisms. However, the lower site is less affected because fewer suspended solids from these events reach that area, leading to less disturbance and a relatively more stable environment for aquatic life.

Timaru Stream

The Timaru Stream is a ringplain stream arising within Te Papa-Kura-o-Taranaki and flows in a westerly direction. There are two SoE sites situated on this stream. Of note, in the 2008-2009 period severe headwater erosion events had impacted upon the macroinvertebrate communities of the upper reaches of this stream (Taranaki Regional Council, 2009). Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 30.

Table 30 Results from SoE surveys performed in the Timaru Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
TMR000150	24/10/1995	53	8-34	25	119-152	138	23	131	Very Good
TMR000375	24/10/1995	53	13-35	26	82-122	105	24	116	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 21-28 taxa at site TMR000150 and 18-27 at site TMR000375. In the most recent 2023 survey, a taxa richness of 23 and 24 were recorded at sites TMR000150 and TMR000375 respectively. Both sites recorded slightly lower than their respective historical medians, but recorded numbers similar to each other.

Since the 2019/20 monitoring year, MCI scores have ranged between 132-143 units at site TMR000150 and 82-122 units at site TMR000375. MCI scores of 131 units and 116 units were recorded at sites TMR000150 and TMR000375 respectively. This categorised the upstream site TMR000150 as having 'very good' macroinvertebrate community health, while the downstream TMR000375 had 'good' health. There was a significant decrease in MCI scores in a downstream direction, with site TMR000375 scoring 15 units less than the upstream site. This is typical for Timaru Stream and is likely due to cumulative agricultural impacts throughout the middle catchment affecting the lower site. The upstream site is expected to have less catchment effects as it sites on the boundary line of Te Papa-Kura-o-Taranaki. The upstream site TMR000150 scored less than the historical median, but not significantly. Meanwhile, the downstream site TMR000375 scored significantly higher than its respective median by 11 units.

Tāngāhoe River

The Tāngāhoe River is an eastern hill country river flowing in a southerly direction with a river mouth located east of Hāwera. Three sites were included in the SoE programme in 2007 for the purpose of monitoring long-term land use changes (afforestation) particularly in the upper-mid catchment.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 31.

Table 31 Results from SoE surveys performed in the Tāngāhoe River together with 2022/23 results

Site	First Sample Date	n	SoE Data 2007-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
TNH000090	04/12/2007	29	9-31	22	90-107	97	7	114	Good
TNH000200	04/12/2007	30	12-35	24	92-116	102	9	109	Good
TNH000515	04/12/2007	30	11-26	20	78-104	94	16	94	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 9-26 taxa at site TNH000090, 12-21 taxa at site TNH000200, and 11-24 taxa at site TNH000515. In the most recent 2023 survey, a taxa richness of 7, 9, and 16 taxa were recorded at sites TNH000090, TNH000200, and TNH000515 respectively. All sites recorded lower than their respective site medians, with the two upstream sites TNH000090 and TNH000200 both recording the lowest taxa richness recorded for the sites to date. The most downstream TNH000515 scored within what is typical for that site.

Since the 2019/20 monitoring year, MCI scores have ranged between 90-102 units at site TNH000090, 94-116 units at site TNH000200, and 85-101 units at site TNH000515. In the most recent survey, MCI scores of 114 units, 109 units, and 94 units were recorded at sites TNH000090, TNH000200, and TNH000515 respectively. This categorised site TNH000090 and TNH000200 as having 'good' macroinvertebrate community health, while TNH000515 had 'fair' health. There was a significant decrease in MCI scores in a downstream direction, with the most downstream site TNH000515 scoring significantly less than upstream sites TNH000090 and TNH000200 (by 20 units and 15 units respectively). The two upstream sites scored similar to each other. All sites scored either the same or more than their respective site medians, with the upstream site TNH000090 scoring significantly more, by 17 units. This site also scored the highest MCI score to date for that site.

Uruti Stream

The Uruti Stream is a small lowland hill country stream that flows in a northerly direction into the Mimitangiatua River. One site in this river was included in the SoE programme in the 2019/20 monitoring year, for the purpose of monitoring an additional site in the Northern Hill country FMU. This is the first time this site will be reported on.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 32.

Table 32 Results from SoE surveys performed in the Uruti Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2019-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
URU000198	29/11/2019	6	14-22	21	88-96	91	15	77	Poor

Since the 2019/20 monitoring year, taxa richness has ranged between 14-22 taxa. In the most recent 2023 survey, a low taxa richness of 15 was recorded, with the majority of taxa being 'tolerant' taxa. This taxa richness was slightly lower than the site median.

Since the 2019/20 monitoring year, MCI scores have ranged between 88-96 units. In the most recent 2023 survey, an MCI score of 77 units was recorded at this site. This categorised the site as having 'poor' macroinvertebrate community health. This score was a significant 14 units less than the site median, and was the lowest recorded MCI score at this site to date, being 11 units lower than the current minimum score recorded.

Due to recent similar comments made by samplers at this site, it is recommended that the appropriateness of future monitoring at this site in the SoE macroinvertebrate programme is reviewed. Being located so close to the confluence with the Mimitangiatua River, this site is likely often inundated by the river during high flows. Additionally, the direct site location is affected by shading of the SH3 Bridge.

Waiau Stream

The Waiau Stream is a small, lowland stream flowing in a northerly direction with the stream mouth situated east of Waitara. One SoE site is located in the mid reaches of this stream.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 33.

Table 33 Results from SoE surveys performed in the Waiau Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1998-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WAI000110	05/02/1998	46	15-30	21	79-101	90	12	97	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 15-22 taxa. In the most recent 2023 survey, this site recorded a low taxa richness of 12 taxa. This was much lower than the median and was the lowest taxa richness for the site to date.

Since the 2019/20 monitoring year, MCI scores have ranged between 86-92 units. In the most recent 2023 survey, an MCI score of 97 units was recorded at site WAI000110, reflecting 'fair' macroinvertebrate community health. This was within the range of that previously recorded at this site. This MCI score was slightly more than the historical median.

Waiongana Stream

The Waiongana Stream has a source within Te Papa-Kura-o-Taranaki and flows in an easterly direction with the stream mouth just east of Bell Block. There are two SoE sampling sites on the Waiongana Stream.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 34.

Table 34 Results from SoE surveys performed in the Waiongana Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WGA000260	18/10/1995	53	9-31	24	82-112	96	20	98	Fair
WGA000450	18/10/1995	53	12-29	21	72-104	89	18	88	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 16-25 taxa at site WGA000260, and 16-25 taxa at site WGA000450. In the most recent 2023 survey, a moderate taxa richness of 20 and 18 were recorded at sites WGA000260 and WGA000450 respectively. Both sites recorded lower than their respective historical medians, but recorded taxa numbers similar to each other.

Since the 2019/20 monitoring year, MCI scores have ranged between 83-110 units at site WGA000260, and 78-104 units at site WGA000450. In the most recent 2023 survey, MCI scores of 98 units and 88 units were recorded at sites WGA000260 and WGA000450 respectively. This categorised both sites as having 'fair' macroinvertebrate community health. There was a decrease in MCI scores in a downstream direction, although this was not significant. The upstream site WGA000260 recorded an MCI score slightly higher than the historical median, while the downstream site WGA000450 recorded slightly less.

Waingongoro River

The Waingongoro River is a large ringplain river with its source inside Te Papa-Kura-o-Taranaki. The river flows in a southerly direction and there are six SoE sites situated along the length of the river.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 35.

Table 35 Results from SoE surveys performed in the Waingongoro River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WGG000115	24/10/1995	54	19-40	30	122-145	133	26	140	Excellent
WGG000150	24/10/1995	54	18-39	26	119-139	129	15	127	Very Good
WGG000500	24/10/1995	54	15-29	22	93-125	104	14	107	Good
WGG000665	24/10/1995	54	14-30	20	77-111	96	16	106	Good
WGG000895	24/10/1995	54	13-25	21	73-106	94	21	98	Fair
WGG000995	24/10/1995	54	12-27	18	69-100	90	20	93	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 19-24 taxa at site WGG000115, 18-25 taxa at site WGG000150, 16-23 taxa at site WGG000500, 15-25 taxa at site WGG000665, 17-23 taxa at site WGG0008995, and 13-27 taxa at site WGG000995. In the most recent 2023 survey, macroinvertebrate taxa richness was low to moderate at the six Waingongoro sites, ranging from 14-26 taxa. The four most upstream sites recorded lower than their respective medians, the fifth site WGG000895 recorded the same as the site median, while the bottom site WGG000995 recorded slightly more than its respective median. Two sites, site WGG000150 and WGG000500 scored the lowest taxa richnesses to date.

Since the 2019/20 monitoring year, MCI scores have ranged between 137-145 units at site WGG000115, 122-139 units at site WGG000150, 99-117 units at site WGG000500, 93-107 units at site WGG000665, 90-98 units at site WGG0008995, and 79-94 units at site WGG000995. In the most recent 2023 survey, MCI scores of 140 units, 127 units, 107 units, 106 units, 98 units, and 93 units were recorded at sites WGG000115, WGG000150, WGG000500, WGG000665, WGG000895, and WGG000995 respectively. These scores categorised site WGG000115 as having 'excellent' macroinvertebrate community health, site WGG000150 as having 'very good' health, sites WGG000500 and WGG000665 as having 'good' health, and sites WGG000895 and WGG000995 as having 'fair' health. MCI scores decreased in a downstream direction. The most upstream sites WGG000115 and WGG000150 scored significantly higher than the downstream sites. The bottom site WGG000995 scored significantly less than all five upstream sites. All sites recorded MCI scores similar to their respective site medians, and were within range of those previously recorded.

Waiau (2) Stream

The Waiau (2) Stream is a lowland coastal stream that flows in a southerly direction into the Waitōtara River. One site in this river was included in the SoE programme in the 2020/21 monitoring year, for the purpose of monitoring an additional site in the Southern Hill country. This is the first time this site has been reported.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 36.

Table 36 Results from SoE surveys performed in the Waiau (2) Stream together with 2022/23 results. *Median value rounded up from 11.5.

Site	First Sample Date	n	SoE Data 2021/22				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WIU000700	13/01/2021	4	5-12	12*	68-77	70	-		Not surveyed

Since the 2020/21 monitoring year when sampling at this site began, taxa richness has ranged between 5-12 taxa, and MCI scores have ranged between 68-77 units. This site was not sampled during the most recent monitoring year due to weather and unsuitable flow conditions.

Waiwhakaiho River

The Waiwhakaiho River is sourced within Te Papa-Kura-o-Taranaki and flows in an easterly direction with its mouth situated in the city of New Plymouth. An additional site was established in the upper reaches of the Waiwhakaiho River during the 2002/03 monitoring period, to complement the three sites in the central to lower reaches of this large ringplain river, in recognition of its importance as a water resource and particularly its proximity to New Plymouth city.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 37.

Table 37 Results from SoE surveys performed in the Waiwhakaiho River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1995-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WKH000100	27/11/2002	39	4-33	20	115-147	131	19	136	Very Good
WKH000500	23/11/1995	53	14-32	22	80-125	109	19	105	Good
WKH000920	23/11/1995	52	7-29	20	60-110	94	9	98	Fair
WKH000950	11/11/1996	51	8-30	20	70-111	88	11	91	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 16-29 taxa at site WKH000100, 14-25 taxa at site WKH000500, 13-22 taxa at site WKH000920, and 10-19 taxa at site WKH000950. In the most recent 2023 survey, taxa richness was low to moderate at the four Waiwhakaiho sites, ranging from 9-19 taxa. All sites recorded lower than their respective medians, but were within the ranges of that previously recorded.

Since the 2019/20 monitoring year, MCI scores have ranged between 128-140 units at site WKH000100, 80-111 units at site WKH000500, 71-105 units at site WKH000920, and 78-99 units at site WKH000950. In the most recent 2023 survey, MCI scores of 136 units, 105 units, 98 units, and 91 units were recorded at sites WKH000100, WKH000500, WKH000920, and WKH000950 respectively. These scores categorised site WKH000100 as having 'very good' macroinvertebrate community health, site WKH000500 as having 'good' health, while the downstream sites WKH000920 and WKH000950 had 'fair' health. All sites scored MCI scores similar to their site medians, and were within the typical range of that recorded for their respective site. The MCI scores recorded at the four sites indicated a decrease in health in a downstream direction, with upstream site WKH000100 scoring significantly more than the three downstream sites. Middle sites WKH000500 and WKH000920 scored similar to each other, however site WKH000950 scored significantly less than all upstream sites.

Waiokura Stream

The Waiokura Stream is a small, southerly flowing ringplain seepage-sourced stream, which has two sites in the SoE programme in recognition of a long-term collaborative study of the effects of best-practice dairy-farming initiatives being evaluated in five dairying catchments throughout the country (Wilcock et al., 2009).

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 38.

Table 38 Results from SoE surveys performed in the Waiokura Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2003-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WKR000500	24/02/2003	35	16-29	23	88-117	102	18	117	Good
WKR000700	24/02/2003	30	15-27	20	92-109	100	14	109	Good

Since the 2019/20 monitoring year, taxa richness has ranged between 16-23 taxa at site WKR000500, and 15-20 taxa at site WKR000700. In the most recent 2023 survey, a low taxa richness of 18 and 14 taxa were recorded at sites WKR000500 and WKR000700 respectively. Both sites recorded lower than their respective historical medians, with downstream site WKR000700 scoring the lowest taxa richness at this site to date.

Since the 2019/20 monitoring year, MCI scores have ranged between 104-117 units at site WKR000500, and 98-109 units at site WKR000700. In the most recent 2023 survey, MCI scores of 117 units and 109 units were recorded at sites WKR000500 and WKR000700 respectively. This categorised both sites as having 'good' macroinvertebrate community health. There was a decrease in MCI scores in a downstream direction, although this was not significant. The upstream site WKR000500 recorded significantly more than the historical median by 15 units, while the downstream site WKR000700 recorded an MCI score higher than the median, although not significantly. Both sites WKR000500 and WKR000700 recorded MCI scores that were equal to the highest scores recorded at these sites to date.

Waimoku Stream

The Waimoku Stream is a small, easterly flowing ringplain stream with a source inside Te Papa-Kura-o-Taranaki in the Kaitake Ranges. There are two SoE sites situated on the stream in the upper and lower reaches.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 39.

Table 39 Results from SoE surveys performed in the Waimoku Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 1999-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WMK000100	22/12/1999	45	15-38	30	119-141	131	21	133	Very Good
WMK000298	22/12/1999	45	10-29	20	75-115	94	20	96	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 15-27 taxa at site WMK000100, and 11-21 taxa at site WKR000700. In the most recent 2023 survey, a moderate taxa richness of 21 and 20 were recorded at sites WMK000100 and WMK000298 respectively. Both sites recorded lower or similar to than their respective historical medians.

Since the 2019/20 monitoring year, MCI scores have ranged between 104-117 units at site WMK000100, and 98-109 units at site WKR000700. In the most recent 2023 survey, MCI scores of 133 units and 96 units were recorded at sites WMK000100 and WMK000298 respectively. This categorised site WMK000100 as

having 'very good' macroinvertebrate community health, while site WMK000298 had 'fair' health. There was a significant decrease in MCI scores in a downstream direction, with the downstream site WMK000298 scoring 37 units less than the upstream site. This is likely due to the upstream site having eight 'highly sensitive' taxa present, while the downstream site only had two of these taxa present. This decrease occurred over a 4km distance from the boundary of Te Papa-Kura-o-Taranaki where the upper site lies. This was a large decrease in condition for a relatively short distance and greater than what would be expected given the relatively intact upper catchment. This was likely due to a combination of factors including poorer habitat quality at this urban stream site, along with poorer water quality.

Waikaramarama Stream

The Waikaramarama Stream is a lowland coastal stream that flows in a northerly direction. One site in this river was included in the SoE programme in the 2020/21 monitoring year, for the purpose of monitoring an additional site in the Northern Hill Country. This is the first time this site has been reported.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 40.

Table 40 Results from SoE surveys performed in the Waikaramarama Stream together with 2022/23 results

Site	First Sample Date	n	SoE Data 2021/22				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WMR000100	18/01/2021	4	18-27	21	95-101	100	13	98	Fair

Since the 2020/21 monitoring year when sampling at this site began, taxa richness has ranged between 18-27 taxa. In the most recent 2023 survey, a low taxa richness of 13 was recorded. This was less than the site median and was the lowest recorded taxa richness to date. However, range changes are to be expected, given the current limited data set.

Since the 2020/21 monitoring year when sampling at this site began, MCI scores have ranged between 95-101 units. In the most recent 2023 survey, an MCI score of 98 units was recorded at this site. This categorised the site as having 'fair' macroinvertebrate community health. This score was slightly less than the historical median, but was within the range previously recorded at this site.

Whenuakura River

The Whenuakura River has a catchment that is in the eastern hill country, with the lowest portion in the Taranaki southern marine terrace. The river flows in a southerly direction, with a mouth between the townships of Pātea and Waverley. One site in this river was included in the SoE programme in the 2015-2016 monitoring year, for the purpose of monitoring an additional site in the eastern hill country.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 41.

Table 41 Results from SoE surveys performed in the Whenuakura River together with 2022/23 results

Site	First Sample Date	n	SoE Data 2015-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WNR000450	14/10/2015	14	11-32	18	71-99	87	-		Not surveyed

Since the 2019/20 monitoring year, taxa richness has ranged between 11-20 taxa, and MCI scores have ranged between 76-91 units. This site was not sampled during the most recent monitoring year due to weather and flow conditions preventing sampling.

Waitara River

The Waitara River is Taranaki's largest river with significant catchment areas in both the eastern hill country and on the eastern side of the Taranaki ringplain. Two SoE sites are situated on the Waitara River.

Historical results, together with results from the current 2022/23 monitoring period are summarised in Table 42.

Table 42 Results from SoE surveys performed in the Waitara River together with 2022/23 results

Site	First Sample Date	n	SoE Data 1996-2022				SoE Data 2022/23		
			Taxa No.		MCI		Taxa No.	MCI	Council Grade
			Range	Median	Range	Median			
WTR000540	15/10/2015	14	8-26	20	83-110	99	-		Not surveyed
WTR000850	31/01/1996	53	8-32	17	64-107	86	12	80	Fair

Since the 2019/20 monitoring year, taxa richness has ranged between 8-22 taxa at site WTR000540 and 9-17 at WTR000850. In the most recent survey, a low taxa richness of 12 was recorded for site WTR000850. This was less than the historical median for the site, and on the lower range of that typically recorded. The upstream site WTR000540 was not sampled during the most recent monitoring year due to weather and flow conditions preventing sampling.

Since the 2019/20 monitoring year, MCI scores ranged between 83-104 units at site WTR000540 and 71-107 units at WTR000850. In the most recent survey, an MCI score of 80 units was recorded at site WTR000850. This categorised the site as having 'fair' macroinvertebrate community health. This score was slightly less than the historical median, but was within the range previously recorded at this site.

Overall

A summary of the proportion of sites within each Council grading band can be found in Table 43 below.

Table 43 Proportion of sites within each Council grading band

Council Grading	Council MCI	
	Sites	%
Excellent	3	4%
Very Good	12	18%
Good	24	36%
Fair	21	31%
Poor	3	5%
Very Poor	1	1%
Not sampled	3	4%

Overall, regional MCI scores ranged from 58 units to 145 units. Ten sites scored MCI scores significantly more than their respective site medians, while one site recorded significantly less than its respective site median, although this was unsurprising as this was only the fourth year of monitoring for that site. Two new maxima and one new minimum scores were recorded during this monitoring period.

Taxa richness ranged from five to 27 taxa. One new maximum and nine new minima taxa richness's were recorded during this monitoring period.

3.2 National state of macroinvertebrate communities (NPS values and bands)

This SoE report now includes scores based on nationally-derived macroinvertebrate tolerance values and NOF bands as defined in Stark & Maxted (2007), in accordance with the NPS-FM.

The following section presents results on macroinvertebrate communities using three attributes: MCI, SQMCI and ASPM calculated using nationally-derived tolerance values over the most recent five-year period. These results are presented independently from previous sections and should not be compared directly. This shift in methodology for analysing nationally-derived scores may appear as inconsistencies compared to previous analyses using regionally-derived results, but more reflects a methodological change. In future assessments, it is recommended to complete a comparative study of regionally-derived and nationally-derived tolerance values and MCI scores to evaluate similarities.

All nationally-derived MCI scores and NOF bands for the 67 sites can be found in Table 44.

3.2.1 Five-year median MCI scores

Based on the NPS-FM NOF bands, 52 of the 67 sites (78%) reported a five-year median MCI score above the national bottom line (≥90). There were 15 sites (22%) that recorded MCI medians below the national bottom line (<90), indicative of severe organic pollution or nutrient enrichment. The majority of the sites (29 sites, or 43%) fell within band C, which states that the macroinvertebrate community is indicative of moderate organic pollution or nutrient enrichment. Twelve sites (18%) were recorded in band A, which are sites indicative of pristine conditions with no pollution or enrichment.

The map indicates that in-stream communities tend to be better within or near the boundary of Te Papa-Kura-o-Taranaki, where many of the rivers and streams originate. As the water bodies move away from the park boundary, macroinvertebrate communities tends to decline in health, with more sites falling into the moderate (band C) or poor (band D) categories. The majority of sites in band D are situated in lowland coastal sites or urban areas (Figure 3). This trend is likely due to various factors such as land use, pollution, and other environmental impacts affecting water quality.

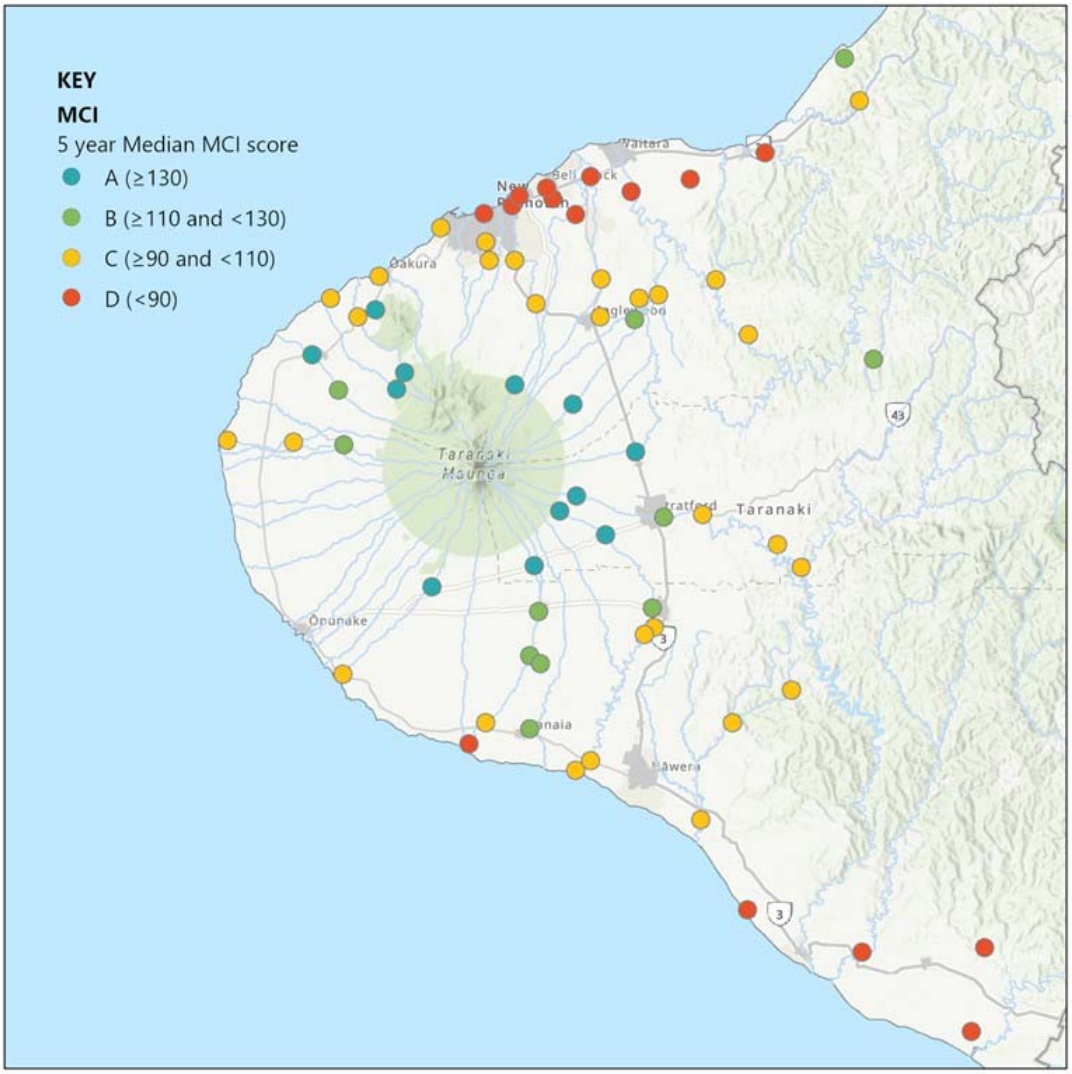


Figure 3 Five-year median MCI scores

3.2.1 Five-year median SQMCI score

Based on the NPS-FM NOF bands, 41 of the 67 sites (61%) reported five-year median SQMCI scores above the national bottom line (a score of 4.5 or higher). There were 26 sites (39%) that recorded SQMCI medians below the national bottom line, indicative of severe organic pollution or nutrient enrichment. There were 18 sites (27%) that fell within band A, which are sites indicative of pristine conditions with no pollution or enrichment. This metric had the highest number of sites in band A out of the three metrics assessed. There were more sites in both bands A and D compared to the MCI scores.

In line with the MCI, but not as pronounced, the SQMCI map also shows that in-stream communities are healthier within or near the boundary of Te Papa-Kura-o-Taranaki. Both maps indicate higher water quality within or near the park boundary, where rivers and streams originate. However, the SQMCI map, which reflects macroinvertebrate abundances not accounted for in the MCI scores, shows a more pronounced decline in water quality as you move away from the park boundary compared to the MCI map. This highlights that the SQMCI scores reveal a greater extent of poor water quality across the region compared to the MCI (Figure 4).

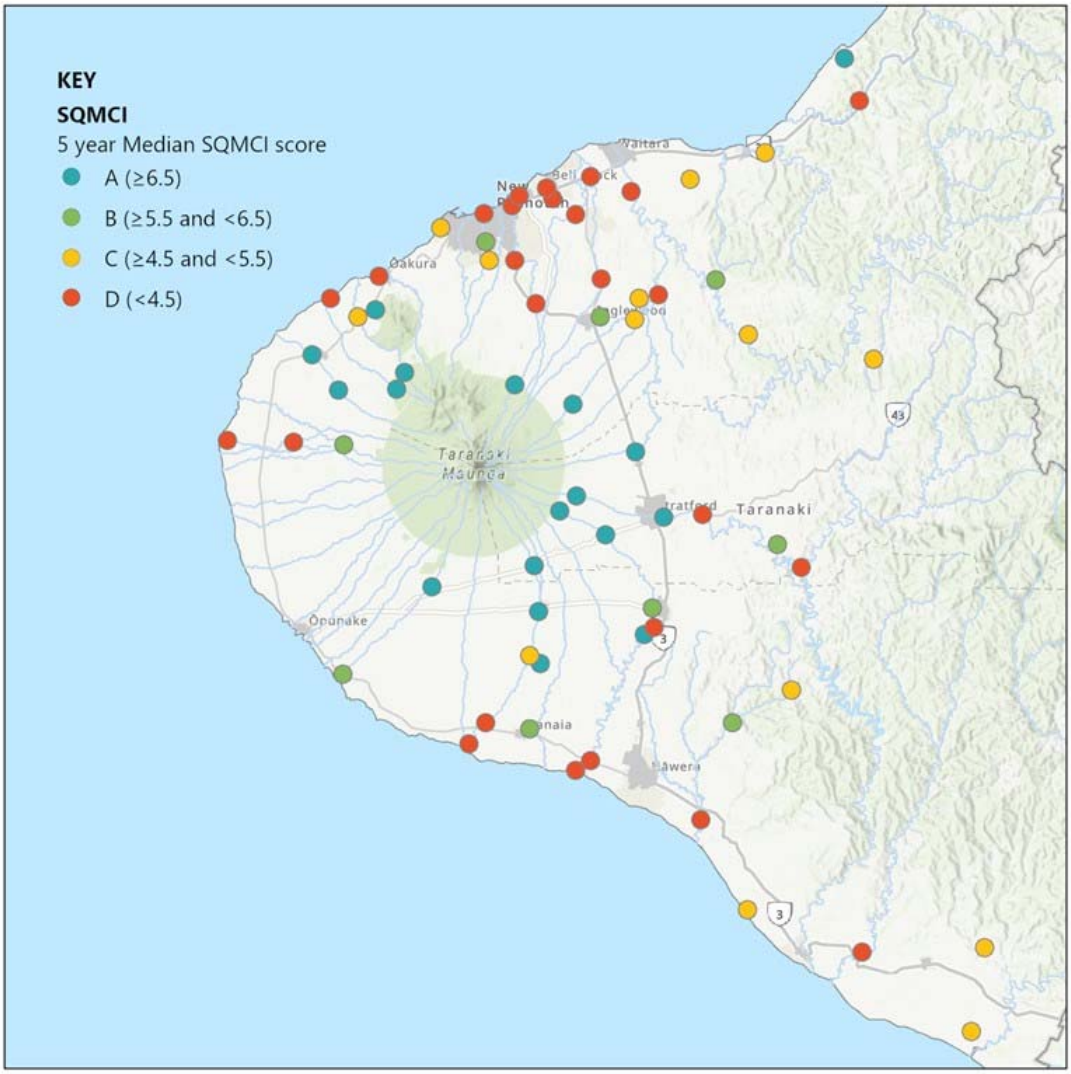


Figure 4 Five-year median SQMCI scores

3.2.1 Five-year median ASPM score

Based on the NPS-FM NOF bands, 59 of the 67 sites (88%) reported five-year median ASPM scores above the national bottom line (a score of 0.3 or higher). Eight sites (12%) recorded ASPM medians below the national bottom line, indicative of severe organic pollution or nutrient enrichment. The majority of the sites (34 sites or 51%) fell within band B, which states that the macroinvertebrate community is indicative of mild organic pollution or nutrient enrichment. Nine sites (13%) were recorded in band A, which are sites indicative of pristine conditions with no pollution or enrichment. This metric had the lowest amount of sites in band A out of the three metrics assessed.

Similarly, like the MCI and SQMCI maps, the ASPM map indicates that in-stream communities are healthier within or near the boundary of Te Papa-Kura-o-Taranaki. The ASPM bands somewhat mirror those of the MCI map, which is unsurprising given that the MCI is used as part of the ASPM calculation, resulting in a certain degree of correlation. The distribution of scores is slightly more balanced however, there are noticeable pockets of poor-quality (band D) scores in the northern and southern parts of the region, particularly in lowland or urban areas (Figure 5).

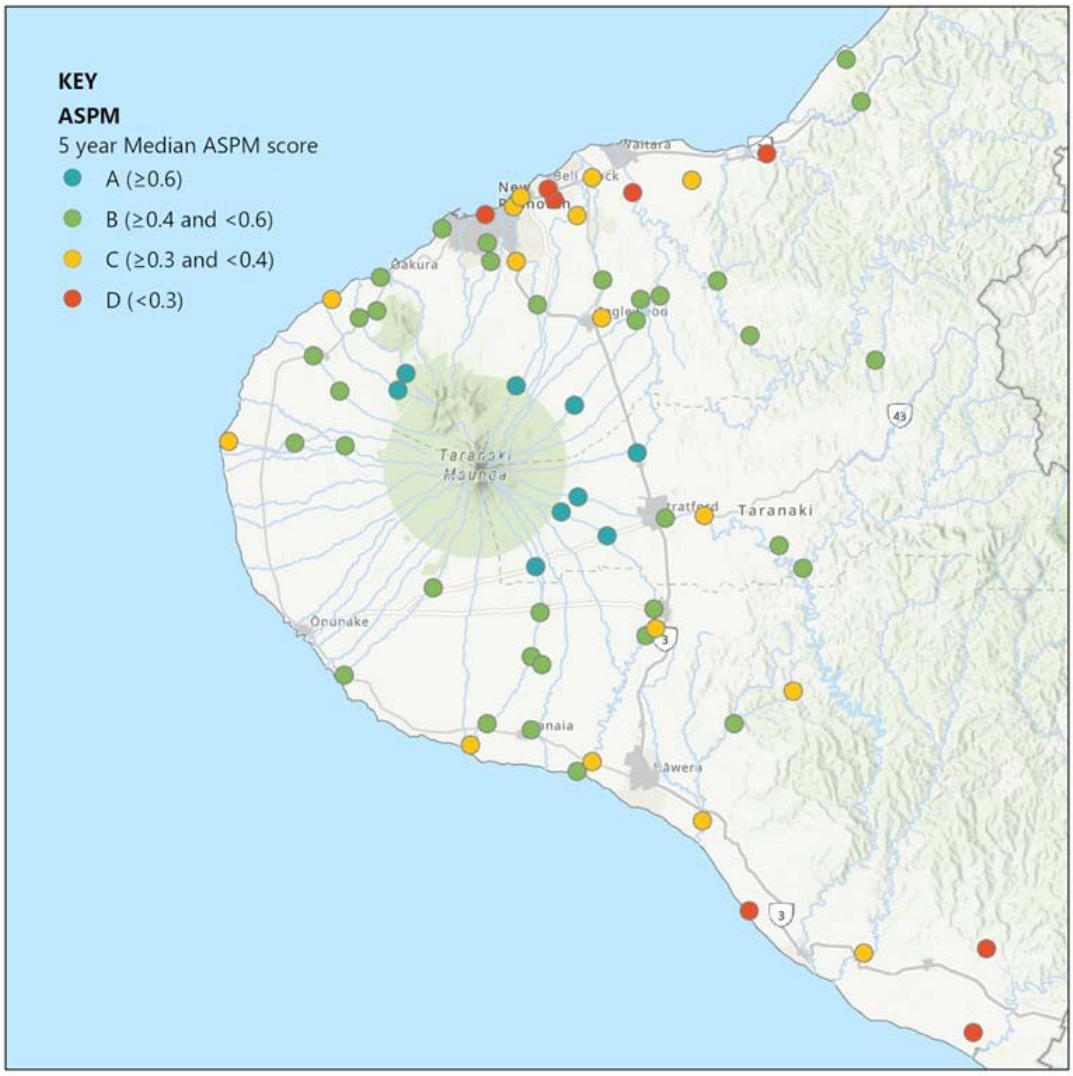


Figure 5 Five-year median ASPM

Note: Site codes with an asterisk (*) indicates new sites with less than five-years of data where partial/incomplete data was used. Table is ordered in alphabetical order by site code, and rivers/streams with multiple sites are listed from upstream to downstream

Table 44 Site-based baseline state for the macroinvertebrate attribute derived from monitored data at 67 monitoring sites in the Taranaki region

River/Stream Name	Site code	5 Year Median MCI	5 Year Median SQMCI	5 Year Median ASPM	MCI	SQMCI	ASPM
Herekawe Stream	HRK000085	98.82	4.63	0.40	C	C	B
Huatoki Stream	HTK000350	102.61	4.61	0.44	C	C	B
	HTK000425	106.43	6.41	0.50	C	B	B
	HTK000745	83.08	3.81	0.26	D	D	D
Kapoaiaia River	KPA000250	118.33	5.55	0.53	B	B	B
	KPA000700	100.00	4.22	0.41	C	D	B
	KPA000950	93.68	4.36	0.38	C	D	C
Kaūpokonui River	KPK000250	134.81	7.77	0.66	A	A	A
	KPK000500	121.90	6.58	0.53	B	A	B
	KPK000660	117.69	5.45	0.50	B	C	B
	KPK000880	102.86	4.04	0.41	C	D	B
	KPK000990	89.47	3.49	0.34	D	D	C
Kurapete Stream	KRP000300	103.08	5.85	0.38	C	B	C
	KRP000660	98.26	5.03	0.46	C	C	B
Katikara Stream	KTK000150	140.00	6.63	0.64	A	A	A
	KTK000248	101.90	3.86	0.38	C	D	C
Makara Stream	MAA000900*	99.41	5.61	0.42	C	B	B
Mangorei Stream	MGE000970	96.00	4.21	0.39	C	D	C
Mangaehu River	MGH000950	98.00	4.46	0.42	C	D	B
Manganui River	MGN000195	136.25	7.64	0.62	A	A	A
	MGN000427	103.53	3.85	0.42	C	D	B
Mangatī Stream	MGT000488	77.33	4.02	0.18	D	D	D
	MGT000520	72.00	3.90	0.19	D	D	D
Makuri Stream	MKR000495*	96.24	5.67	0.40	C	B	B
Maketawa Stream	MKW000200	140.77	7.38	0.67	A	A	A

River/Stream Name	Site code	5 Year Median MCI	5 Year Median SQMCI	5 Year Median ASPM	MCI	SQMCI	ASPM
	MKW000300	111.82	4.53	0.52	B	C	B
Moumahaki Stream	MMK000050*	88.29	4.58	0.29	D	C	D
Mangaoreti Stream	MNT000950*	75.00	4.81	0.14	D	C	D
Mangaoraka Stream	MRK000420	88.89	3.700	0.39	D	D	C
Mangaroa Stream	MRO000210*	78.00	4.66	0.20	D	C	D
Matau Stream	MTA000068*	113.95	4.97	0.50	B	C	B
Mangawhero Stream	MWH000490	95.00	4.37	0.38	C	D	C
Pātea River	PAT000200	148.89	8.02	0.73	A	A	A
	PAT000315	124.00	6.63	0.54	B	A	B
	PAT000360	91.43	3.44	0.32	C	D	C
Pūnehu Stream	PNH000200	132.63	7.55	0.57	A	A	B
	PNH000900	102.22	5.54	0.43	C	B	B
Stony River	STY000300	117.50	7.77	0.49	B	A	B
	STY000400	132.00	7.68	0.51	A	A	B
Timaru Stream	TMR000150	138.26	7.07	0.66	A	A	A
	TMR000375	109.63	5.19	0.52	C	C	B
Tāngāhoe River	TNH000090	97.78	4.67	0.39	C	C	C
	TNH000200	106.67	5.80	0.44	C	B	B
	TNH000515	92.63	4.39	0.37	C	D	C
Uruti Stream	URU000198*	94.14	4.27	0.40	C	D	B
Waiau Stream	WAI000110	86.36	5.04	0.36	D	C	C
Waiongana Stream	WGA000260	94.55	3.94	0.41	C	D	B
	WGA000450	87.78	3.96	0.36	D	D	C
Waingongoro River	WGG000115	147.37	8.20	0.69	A	A	A
	WGG000150	140.00	7.73	0.61	A	A	A
	WGG000500	115.71	6.28	0.48	B	B	B
	WGG000665	109.00	7.12	0.45	C	A	B

River/Stream Name	Site code	5 Year Median MCI	5 Year Median SQMCI	5 Year Median ASPM	MCI	SQMCI	ASPM
	WGG000895	97.65	4.46	0.39	C	D	C
	WGG000995	93.85	4.13	0.41	C	D	B
Waiau Stream (2)	WIU000700*	78.33	4.65	0.19	D	C	D
Waiwhakaiho River	WKH000100	141.05	7.81	0.68	A	A	A
	WKH000500	105.26	3.57	0.44	C	D	B
	WKH000920	86.15	3.56	0.32	D	D	C
	WKH000950	85.26	3.19	0.30	D	D	C
Waiokura Stream	WKR000500	112.22	7.06	0.47	B	A	B
	WKR000700	110.59	6.00	0.46	B	B	B
Waimōku Stream	WMK000100	137.65	7.79	0.57	A	A	B
	WMK000298	103.53	4.09	0.41	C	D	B
Waikaramamara Stream	WMR000100*	110.00	6.78	0.43	B	A	B
Whenuakura Stream	WNR000450*	89.41	4.26	0.31	D	D	C
Waitara River	WTR000540*	98.68	4.62	0.42	C	C	B
	WTR000850	86.67	3.74	0.28	D	D	D

Table 45 below compares the total number of sites within each NOF band for the three macroinvertebrate metrices. For the MCI, the distribution shows fewer sites in band A compared to the SQMCI, but more sites in band C, indicating sites of intermediate quality. In contrast, the SQMCI has the largest number of sites in band A, but slightly fewer sites in bands B and C compared to MCI. Notably, although the SQMCI has the highest number of sites in band A, it also has the highest amount of sites in band D. For ASPM, the number of sites in band B is the largest among the three metrics, while the number of sites in bands A and D are the smallest of the three metrics. To gain a comprehensive understanding of the overall water quality, it is essential to consider these three metrics together rather than in isolation, as each provides different insights into site conditions.

Table 45 Total sites within each NOF band for macroinvertebrate attributes using 5-year medians scores calculated from the latest five summer results

NOF BAND	MCI		SQMCI		ASPM	
	Sites	%	Sites	%	Sites	%
A	12	18%	18	27%	9	13%
B	11	16%	9	13%	34	51%
C	29	43%	14	21%	16	24%
D	15	22%	26	39%	8	12%

The majority of Taranaki's waterways (based on the monitoring sites included in the Freshwater Macroinvertebrate SoE Monitoring Programme) were found to be in better ecological health than the national bottom lines, ranging from 61% (two-thirds) For the SQMCI to 88% for the ASPM, depending on the ecological attribute considered.

The stretches of streams and rivers in Taranaki where all three of the NPS-FM attributes for ecological health are in band A, are Kaūpokonui River (KPK000250), Katikara Stream (KTK000150), Manganui River (MGN000195), Maketawa Stream (MKW000200), Pātea River (PAT000200), Timaru Stream (TMR000150), Waingongoro River (WGG000115 and WGG000150) and Waiwhakaiho River (WKH000100). These sites represent the healthiest aquatic communities found in the region, as shown by this monitoring programme.

The stretches of streams and rivers in Taranaki where all three of the NPS-FM attributes for ecological health were found to be in the poorest health (within band D), are Huatoki Stream (HTK000745), Mangatī Stream (MGT000488 and MGT000520) and Waitara River (WTR000850). These sites host the least healthy aquatic communities in the region and are likely affected by urbanization and industrialization. Additionally, habitat modification and a general decline in water quality, such as the accumulation of diffuse and point source discharges in the lower reaches of the catchments, contribute to their poor condition. Eighteen sites (27% of monitored sites) have at least one NPS attribute of ecological health in the A band. Thirty-one sites (46% of monitored sites) have at least one NPS attribute of ecological health in the D band.

These results are discussed in more detail in Section 4.

3.3 Regional analysis of trends

Trend analyses using regionally-derived MCI scores were completed for 56 sites. The remaining 11 sites did not have sufficient data for a trend analysis. Long-and short-term trends results are illustrated in Figures 6 and 7 and are also summarised in Table 46.

Temporal trends measured for the 56 sites with complete data throughout the full SoE monitoring period (referred to as 'long-term trends') indicated that 42 sites had positive trends (nine 'likely improving' and 33 'very likely improving'), while eight sites exhibited negative trends (five 'likely degrading' and three 'very likely degrading'). The remaining six sites had an 'indeterminate' trend direction. These trends suggest that a majority of sites in the SoE monitoring programme have showed some degree of improvement in the state of the in-stream communities since the beginning of their monitoring in the programme.

In contrast, trends for sites between the monitoring period of 2013 and 2023 (referred to as 'short-term trends') showed a different pattern: only 20 sites displayed positive trends (13 'likely improving' and seven 'very likely improving'), while 18 sites showed negative trends (11 'likely degrading' and seven 'very likely degrading'). The remaining 20 sites had an 'indeterminate' trend direction. Compared to the long-term trends, these results indicated a more balanced distribution of positive and negative trends, with now more than twice the number of sites showing degradation than seen in the long-term trends. Additionally, the proportion of sites showing an 'indeterminate' trend increased, and the overall amount of sites showing a positive trend decreasing by more than half. This indicates that, at least since 2013, that many sites have experienced a short-term decline in the health of their in-stream communities.

The comparison suggests that while the long-term trends might have shown generally positive or mixed outcomes, the reduction in improving trends and the increase in degrading trends over the past decade indicate a more recent change in environmental conditions and/or human activities however, at present it is not clear what has driven this change. This shift highlights the importance of conducting more targeted studies on the factors influencing ecological health so that appropriate measures can be taken to support and mitigate degradation in the region.

A rolling graph comparison of how trend categories have changed over time is illustrated in Figure 8. Throughout the monitoring programme, a shift is evident from predominantly improving trends in 2005 to an increase in degradation trends, particularly from 2017 onwards. Between 2020 and 2023, there has been a noticeable decrease in the number of sites in degrading categories, while the numbers of sites in improving categories have increased significantly. The distribution of trends has become more balanced, with the most recent two years showing an even spread across categories. This transition from mostly positive to negative trends suggests a decline in in-stream community health. However, the decrease in 'degrading' trends after 2020 could indicate recent improvements at sites. In the future, detailed investigation into the drivers of macroinvertebrate health could provide insight into what is driving degradation or improvement at these sites. However, the recent decrease in degrading trends might indicate some improvements. Future investigations into macroinvertebrate health drivers could provide further insights into these trends.

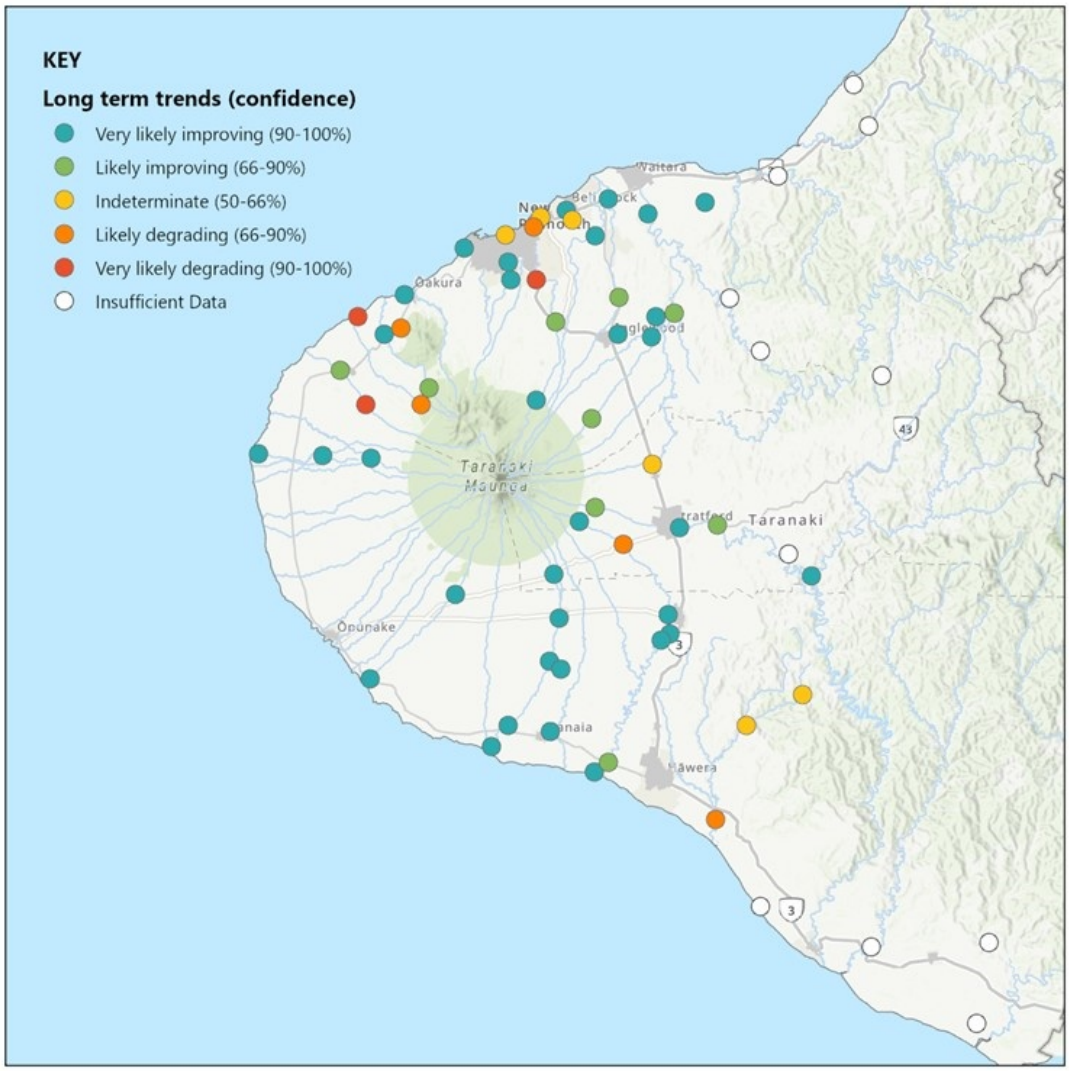


Figure 6 Long-term trends for sites in the SoE macroinvertebrate monitoring programme (01 July 1995 – 30 June 2023)

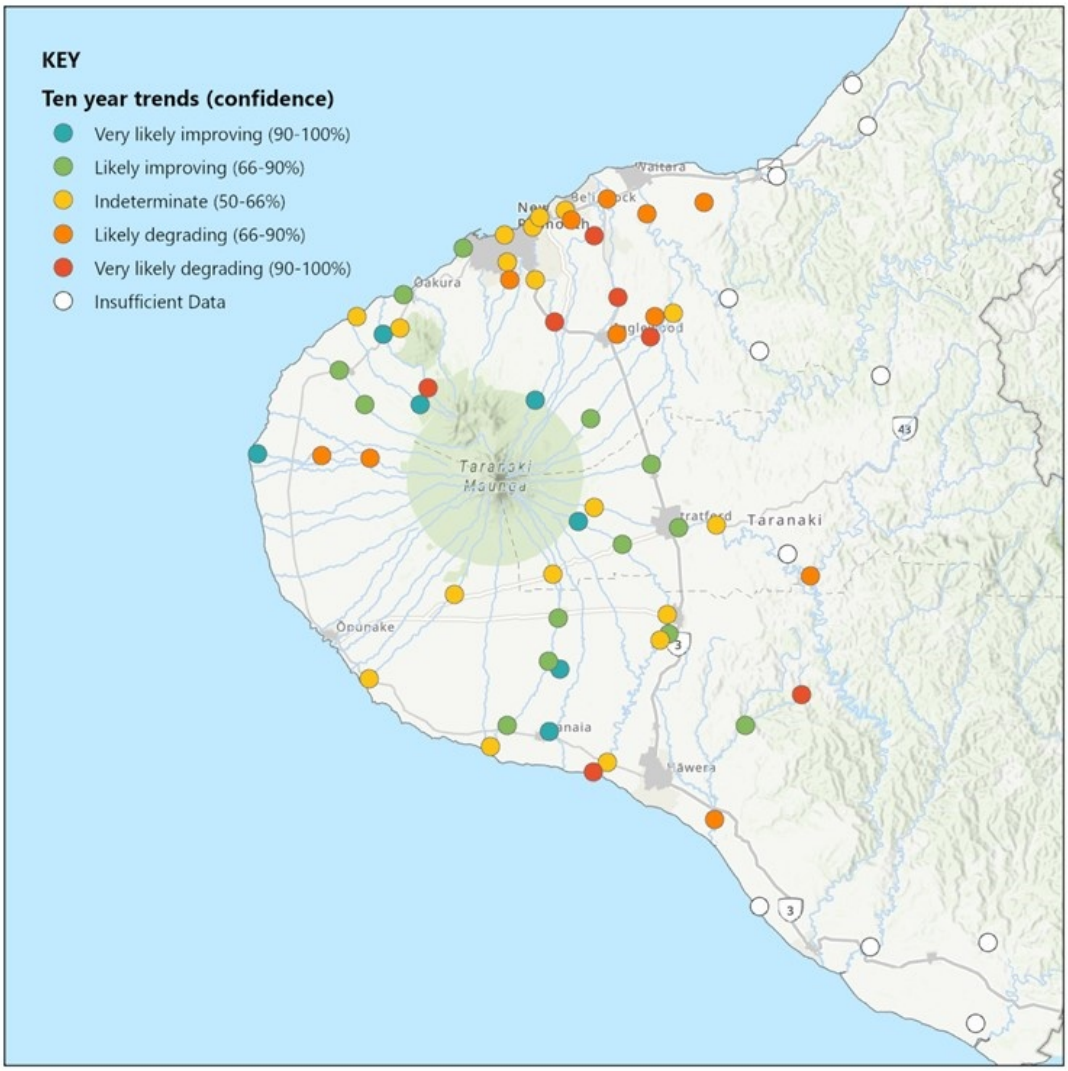


Figure 7 Short-term trends for sites in the SoE macroinvertebrate monitoring programme (01 July 2013 – 30 June 2023)

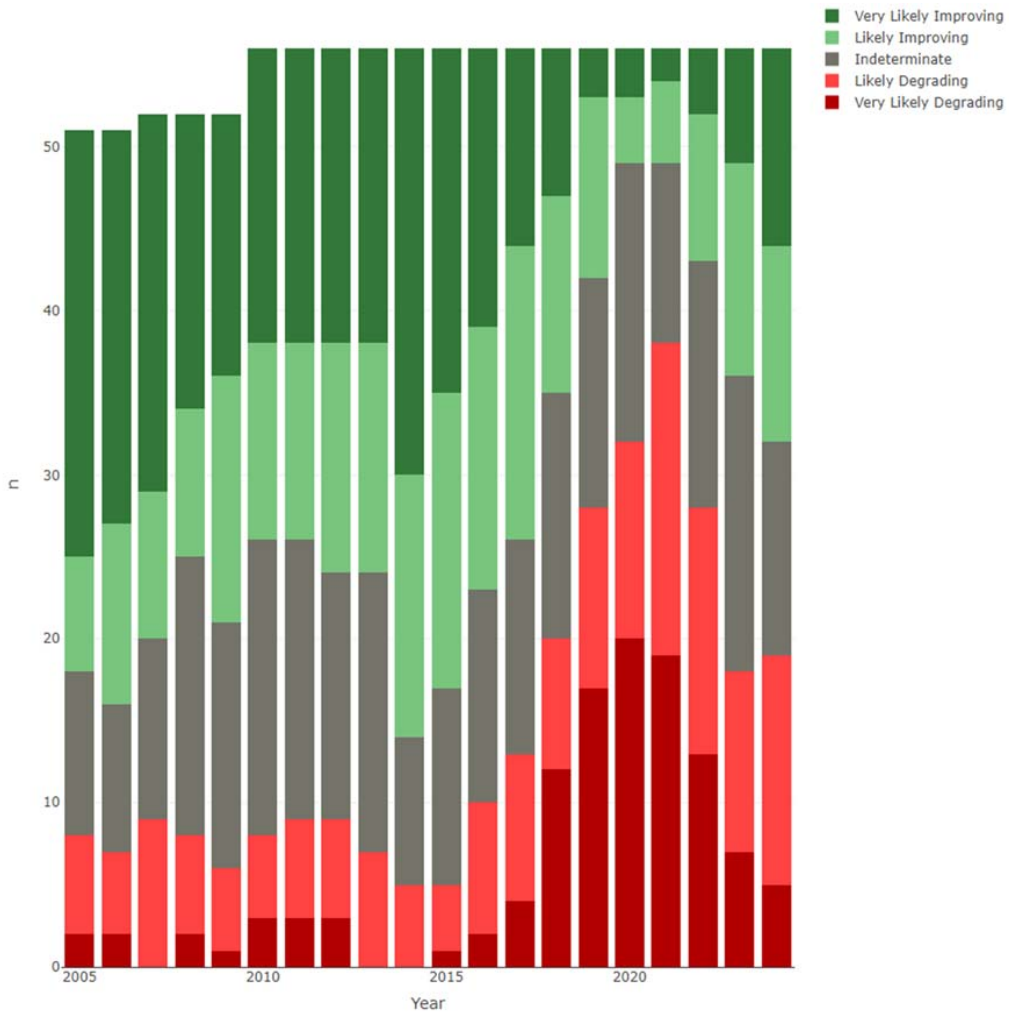


Figure 8 Rolling graph of trend categories of MCI scores over time

Note: Trends analysed using regional tolerance scores for macroinvertebrates. Direction symbols received from LAWA.

Table 46 Trend analysis on long-term and ten-year MCI datasets for each site with >10 years of data

River	Site	Long-term Trends					Ten-year Trends				
		n	Trend	Likelihood	% Change		n	Trend	Likelihood	% Change	
Herekawe Stream	HRK000085	55	Very Likely Improving	1.00	0.42		18	Likely Improving	0.86	0.44	
Huatoki Stream	HTK000350	55	Very Likely Improving	1.00	0.68		18	Likely Degrading	0.68	-0.21	
	HTK000425	55	Very Likely Improving	1.00	0.33		18	Indeterminate	0.55	0.11	
	HTK000745	55	Indeterminate	0.62	-0.06		18	Indeterminate	0.53	-0.19	
Kapoaiaia Stream	KPA000250	55	Very Likely Improving	1.00	0.89		19	Likely Degrading	0.90	-0.60	
	KPA000700	55	Very Likely Improving	1.00	0.74		19	Likely Degrading	0.85	-0.70	
	KPA000950	48	Very Likely Improving	1.00	0.48		19	Very Likely Improving	0.94	0.63	
Kaupokonui River	KPK000250	51	Very Likely Improving	0.99	0.17		19	Indeterminate	0.51	0.07	
	KPK000500	47	Very Likely Improving	1.00	0.57		19	Likely Improving	0.85	0.71	
	KPK000660	47	Very Likely Improving	1.00	0.99		19	Likely Improving	0.69	0.35	
	KPK000880	55	Very Likely Improving	1.00	0.52		19	Likely Improving	0.90	0.97	
	KPK000990	55	Very Likely Improving	0.97	0.39		19	Indeterminate	0.53	0.00	
Kurapete Stream	KRP000300	54	Very Likely Improving	1.00	0.64		18	Likely Degrading	0.86	-0.64	
	KRP000660	54	Very Likely Improving	1.00	0.68		18	Likely Degrading	0.74	-0.23	
Katikara Stream	KTK000150	54	Likely Degrading	0.78	-0.08		18	Very Likely Improving	0.99	0.93	
	KTK000248	54	Very Likely Degrading	0.92	-0.22		18	Indeterminate	0.50	0.00	
Makara Stream	MAA000900	Insufficient data for trends									
Mangorei Stream	MGE000970	55	Very Likely Degrading	0.94	-0.34		18	Indeterminate	0.55	-0.02	
Mangaehu River	MGH000950	54	Very Likely Improving	1.00	0.81		19	Likely Degrading	0.71	-0.27	
Manganui River	MGN000195	54	Indeterminate	0.63	-0.03		19	Likely Improving	0.70	0.14	
	MGN000427	55	Likely Improving	0.77	0.12		19	Indeterminate	0.53	-0.26	
Mangati Stream	MGT000488	53	Indeterminate	0.61	0.05		18	Likely Degrading	0.83	-1.14	
	MGT000520	54	Very Likely Improving	1.00	0.88		18	Indeterminate	0.65	-0.60	
Makuri Stream	MKR000495	Insufficient data for trends									

River	Site	Long-term Trends					Ten-year Trends				
		n	Trend	Likelihood	% Change		n	Trend	Likelihood	% Change	
Maketawa Stream	MKW000200	55	Likely Improving	0.87	0.14		18	Likely Improving	0.89	0.50	
	MKW000300	55	Very Likely Improving	1.00	0.56		18	Very Likely Degrading	0.99	-0.72	
Moumahaki Stream	MMK000050	Insufficient data for trends									
Mangaoreti Stream	MNT000950	Insufficient data for trends									
Mangaoraka Stream	MRK000420	54	Very Likely Improving	0.99	0.42		18	Very Likely Degrading	0.94	-0.67	
Mangaroa Stream	MRO000210	Insufficient data for trends									
Matau Stream	MTA000068	Insufficient data for trends									
Mangawhero Stream	MWH000490	55	Very Likely Improving	1.00	1.05		19	Likely Improving	0.84	0.65	
Pātea River	PAT000200	55	Likely Improving	0.90	0.10		19	Indeterminate	0.64	0.14	
	PAT000315	55	Very Likely Improving	1.00	0.33		19	Likely Improving	0.84	0.48	
	PAT000360	55	Likely Improving	0.72	0.05		19	Indeterminate	0.54	0.02	
Punehu Stream	PNH000200	54	Very Likely Improving	1.00	0.40		19	Indeterminate	0.65	-0.31	
	PNH000900	46	Very Likely Improving	1.00	0.94		19	Indeterminate	0.62	0.38	
Stony River	STY000300	46	Very Likely Degrading	0.96	-0.22		18	Likely Improving	0.69	0.21	
	STY000400	55	Likely Improving	0.70	0.10		18	Likely Improving	0.86	1.52	
Timaru Stream	TMR000150	55	Likely Improving	0.73	0.03		18	Very Likely Degrading	0.94	-0.62	
	TMR000375	54	Very Likely Improving	1.00	0.64		18	Very Likely Improving	0.90	1.26	
Tangahoe River	TNH000090	52	Indeterminate	0.50	0.00		18	Very Likely Degrading	0.94	-0.91	
	TNH000200	53	Indeterminate	0.58	0.09		19	Likely Improving	0.82	0.35	
	TNH000515	54	Likely Degrading	0.68	-0.15		19	Likely Degrading	0.72	-0.19	
Uruti Stream	URU000198	Insufficient data for trends									
Waiau Stream	WAI000110	54	Very Likely Improving	0.99	0.32		18	Likely Degrading	0.84	-0.63	
Waiongana Stream	WGA000260	46	Likely Improving	0.75	0.09		18	Very Likely Degrading	0.91	-0.82	
	WGA000450	44	Very Likely Improving	1.00	0.50		18	Likely Degrading	0.86	-0.55	
Waingongoro River	WGG000115	52	Very Likely Improving	1.00	0.26		19	Very Likely Improving	1.00	0.89	

River	Site	Long-term Trends					Ten-year Trends				
		n	Trend	Likelihood	% Change		n	Trend	Likelihood	% Change	
	WGG000150	52	Likely Degrading	0.68	-0.05		19	Likely Improving	0.80	0.32	
	WGG000500	52	Very Likely Improving	1.00	0.42		19	Indeterminate	0.62	-0.14	
	WGG000665	47	Very Likely Improving	1.00	0.44		19	Indeterminate	0.60	0.07	
	WGG000895	47	Likely Improving	0.78	0.06		19	Indeterminate	0.64	0.13	
	WGG000995	47	Very Likely Improving	0.92	0.19		19	Very Likely Degrading	0.91	-0.68	
Waiau Stream (2)	WIU000700	Insufficient data for trends									
Waiwhakaiho	WKH000100	45	Very Likely Improving	0.98	0.32		18	Very Likely Improving	0.96	0.53	
	WKH000500	44	Likely Improving	0.80	0.15		18	Very Likely Degrading	0.99	-1.67	
	WKH000920	40	Likely Degrading	0.74	-0.13		17	Indeterminate	0.50	-0.10	
	WKH000950	40	Indeterminate	0.64	-0.09		18	Indeterminate	0.58	0.35	
Waiokura Stream	WKR000500	36	Very Likely Improving	1.00	1.00		19	Very Likely Improving	0.98	0.96	
	WKR000700	31	Very Likely Improving	0.99	0.46		19	Very Likely Improving	0.98	0.86	
Waimoku Stream	WMK000100	30	Likely Degrading	0.72	-0.05		18	Indeterminate	0.59	-0.11	
	WMK000298	31	Very Likely Improving	1.00	0.74		18	Likely Improving	0.70	0.26	
Waikaramarama River	WMR000100	Insufficient data for trends									
Whenuakura River	WNR000450	Insufficient data for trends									
Waitara River	WTR000540	Insufficient data for trends									
	WTR000850	31	Very Likely Improving	1.00	0.74		19	Likely Degrading	0.76	-1.07	

For the 56 sites analysed for trends, over the long term 42 (75%) of sites have shown a likely or very likely improvement, and eight (14%) of sites have shown a likely or very likely deterioration. Over the most recent short term, 20 sites (36%) have shown a likely or very likely improvement, and 18 sites (32%) have shown a likely or very likely deterioration.

The stretches of streams and rivers which have shown a very likely improvement over both the long term and the more recent short term are Kapoaiaia Stream (KPA000950), Maketawa Stream (MKW000300), Timaru Stream (TMR000375), Waingongoro River (WGG000115), Waiwhakaiho River (WKH000100), and Waiokura Stream (WKR000500 and WKR000700). In contrast, there are zero stretches of the stretches of streams and rivers which have shown a very likely deterioration over both the long term and the more recent short term. These results are discussed in detail in Section 4.

4. Discussion

This report summarised the 2019/20 to 2022/23 monitoring period. The 2022/23 sampling year was the 28th year of the Council's macroinvertebrate SoE programme. This report describes the macroinvertebrate communities at the 67 sites established in the Taranaki Region.

Results are discussed in terms of macroinvertebrate taxa richness and regionally-derived MCI scores, which are discussed in relation to historical data for each site. Long- and short-term temporal trends using regionally-derived MCI data were identified where possible. Additionally, in compliance with NPS-FM guidelines, five-year medians have been calculated and presented.

Macroinvertebrate community composition and health can be influenced by a wide range of factors. The MCI and SQMCI indices were developed to assess the impact of organic pollution and nutrient enrichment on these communities (Stark, 1985; Stark 1998; and Stark et al., 2001). Stark and Maxted (2007) emphasized that "biotic indices rely on the fact that biological communities are a product of their environment, in that different kinds of organisms have different habitat preferences and pollution tolerances." Consequently macroinvertebrate indices respond to various environmental factors such as water flow, sedimentation, shading, temperature, and dissolved oxygen, to name a few. The resulting states and trends in macroinvertebrate health are influenced by multiple pressures and drivers, as illustrated by the Collier et al., 2014 model (Figure 9).

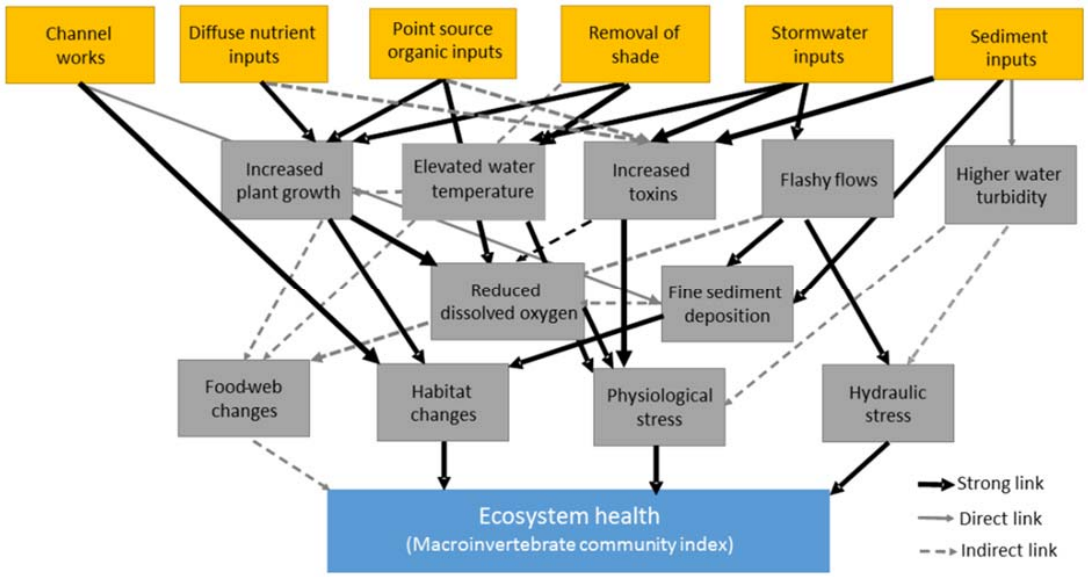


Figure 9 Conceptual causal model identifying the expected causal links between human pressures and Macroinvertebrate Community Index (MCI) from Collier et al., 2014

Ideally, to fully understand the factors influencing macroinvertebrate community composition, a comprehensive grasp of the relevant variables and their interactions is essential. However, our current data on several key variables is limited. While we have an excellent database of historical physicochemical water quality, including metrics such as dissolved inorganic nitrogen and dissolved reactive phosphorus, the number of monitored sites in this database is relatively few compared to the number of sites in the SoE macroinvertebrates programme. This data relates solely to the state of the water at the time of sampling rather than collecting a continuous data record. It is recommended that data analysis is carried out on data held by the Council to explore potential drivers of macroinvertebrate health in the region. Additionally, an analysis of the six REC factors (land cover, climate, valley landform, network position, geology, and flow source) could be undertaken to test whether differences in REC factors could be affecting macroinvertebrate

communities. Further analysis could provide insight onto why trends and results are changing and could assist in site targeting for future programmes and monitoring.

Regional (Taranaki)

When comparing to the entire monitoring period (2019/20 to 2022/23), there were several new minima and maxima MCI scores prior to the 2023 monitoring year:

- In 2020, three sites (PAT000360, TMR000375, and TNH000090) established new minima MCI scores, while three sites (PNH000200, WGA000450, and WGG000115) obtained new maxima MCI scores.
- In 2021, one site (WKH000500) established a new minimum MCI score, while two sites (KTK000150, WKR000500, and WT000850) established new maxima MCI scores.
- In 2022, no sites established a new minimum MCI score, however, ten sites (KPK000250, KRP000660, MGH000950, MGT000520, PAT000200, TMR000375, TNH000200, WGG000150, WKR000700, and WMK000298) established new maxima MCI scores.
- Note: the new minima and maxima MCI scores set during the 2020-2022 monitoring period do not include sites which were established into the programme since the 2020 monitoring period.

The results from the most recent 2023 monitoring year have shown that:

- For regional MCI scores, three sites were categorised as having 'excellent' health, 12 sites were categorised as having 'very good' health, 24 sites were categorised as having 'good' health, 21 sites were categorised as having 'fair' health, three sites were categorised as having 'poor' health, and one site was categorised as having 'very poor' health.
- Regional MCI scores ranged from 58 units to 145 units.
- Ten sites reported MCI scores significantly higher than their respective site medians, while one site recorded an MCI significantly less than its respective site median (noting that this was only the fourth year of monitoring for that site and as such, the data record is currently limited).
- Two new maximum regional MCI scores (PNH000900 and TNH000090) and one new minimum regional MCI score (URU000198) were established during the 2022/23 monitoring period.
- Taxa richness ranged from five to 27 taxa.
- One new maximum taxa richness (MKR000495) and nine new minima taxa richnesses (KPK000880, MGE000970, MMK000050, TNH000090, TNH000200, WGG000150, WGG000500, WKR000700, and WMR000100) were recorded during the 2022/23 monitoring period.

The lower Mangatī Stream site (MGT000520) recorded an MCI score reflective of 'very poor' health and a low taxa richness of eight taxa, seven of which were 'tolerant'. The lower reaches of the Mangatī Stream flow through the Mangatī industrial area, and site MGT000520 is situated downstream of this area, approximately 400m below Devon Road. It is likely that the macroinvertebrate communities at MGT000520 have been impacted by cumulative stormwater and wastewater discharges from this industrial area. In the spring 2021 survey a 'fair' MCI score of 80 units was recorded. Prior to this, MCI scores have consistently reflected 'very poor' to 'poor' macroinvertebrate community health. During the period under review, this site also scored 'very poor' MCI scores in the spring 2020 survey (58 units) and spring 2021 survey (56 units).

The three sites which recorded MCI scores reflective of 'poor' health were all sites which were recent additions to the programme since the last 2018-2019 report (MMK000050, MRO000210, and URU000198). Since these sites were established into the SoE programme, they have only scored MCI scores reflecting either 'fair' or 'poor' health. As monitoring continues for these sites, it would not be surprising to see the MCI ranges for these sites expand in either direction.

In general, data indicated that macroinvertebrate communities at sites in the upper reaches of catchments comprise a greater proportion of taxa that are 'sensitive' to the effects of nutrient enrichment and poor

habitat conditions compared to communities in the mid and lower reaches. These changes in community composition likely result from the impacts of nutrient enrichment, sedimentation, turbidity, increased sunlight (due to less riparian shading and potentially wider rivers), higher temperatures, increased algal and macrophyte growth, lower water levels, and reduced aeration (mixing), leading to lower dissolved oxygen levels. In future, it is recommended that a more comprehensive analysis be conducted, considering these factors to identify the overall drivers of macroinvertebrate health in our region.

The upper reaches of catchments often had a higher taxa richness than the lower reaches. Generally, there is also a greater proportion of taxa sensitive to nutrient enrichment and poor habitat quality in the upper reaches compared to communities in the mid and lower reaches. However, various factors can influence taxa richness, and some upper sites are negatively affected by headwater erosion events. Additionally, mild nutrient enrichment can sometimes increase taxa richness, so care must be taken when interpreting these results. Nonetheless, taxa richness is very useful in determining the presence or effects of pollution events, as toxic discharges invariably reduce richness.

The results from the 2022/23 monitoring period indicate a gradual decline in macroinvertebrate community health downstream (Figure 2). Sites classified as ‘excellent’ are predominantly located near or within the boundaries of Te Papa-Kura-o-Taranaki, whereas sites scoring ‘fair’ or lower are closer to the coast. Enhancing stream health, especially at sites in the lower reaches of ring plain streams, is unlikely to be significant or meaningful without substantial improvements in habitat and water quality upstream. Such improvements involve initiatives like riparian fencing/planting and redirecting discharges from dairy pond treatment systems away from direct surface water disposal to land irrigation.

It's not surprising to observe degradation in in-stream communities in the lower reaches, as indicated by the prevalence of taxa tolerant to organic impacts. However, noticeable temporal improvements may not occur until comprehensive management strategies are implemented across the entire catchment area.

During the monitoring period, sites in the middle and lower reaches generally showed lower summer MCI scores compared to spring MCI scores. This difference can be attributed to the factors mentioned earlier and possibly to lifecycle patterns. Some taxa appear as large nymphs in spring but may not be detected in summer surveys due to their transition to egg or first instar stages, which are challenging to identify at the genus level. Consequently, less sensitive taxa are more prevalent in summer surveys, alongside an increase in 'tolerant' taxa.

For detailed seasonal patterns, previous reports with both spring and summer surveys and seasonal analyses provide further insights. However, seasonal analyses for the 2023 monitoring year were not conducted due to the discontinuation of spring surveys.

The decreasing gradient of in-stream health from ‘very good’ in the upper reaches of ringplain streams to ‘fair’ in the lower reaches reflects a downstream shift in macroinvertebrate communities towards taxa more tolerant of nutrient enrichment and habitat deterioration. These communities have adapted to cumulative impacts from upstream point source discharges and diffuse runoff, making them resilient to further impacts, except those from toxic discharges. Therefore, significant improvements in water quality and habitat are necessary in lower reach communities before statistically and ecologically meaningful changes can be observed.

National (NPS-FM)

In total, 56 sites had the most recent five-year median scores calculated using complete and robust data, while 11 sites used partial/incomplete data.

Overall, all three metrics show a similar trend where water quality is higher within or near the boundary of Te Papa-Kura-o-Taranaki and tends to decrease with increasing distance away from the park. The concentration of high quality sites in band A is evident within or around the park boundary for all three

metrics. MCI and ASPM showed similar patterns of distribution, with ASPM having smaller pockets of poor quality sites that fell within band D. The SQMCI attribute had the most pronounced indication of poor water quality.

In the past, MCI has been considered the best index to assess the state of the environment for macroinvertebrates (Stark and Maxted, 2007) and this shows that 78% of sites were above the NPS-FM national bottom line. MCI and ASPM were highly correlated with all ASPM sites that fell within band D also being sites that fell within band D for MCI. The remaining MCI sites where ASPM was not also in band D were sites in which the ASPM were at the lower band C range.

With the numeric states collated, 30 sites (45%) have at least one numeric state that fails to achieve national bottom line.

There were nine sites throughout eight rivers/streams that had all three numeric attributes within band A, all of which were the most upstream sites for the respective rivers/streams. All sites in which the ASPM band was in band A also had both MCI and SQMCI in band A.

There were four sites throughout three rivers/streams that had all three numeric attributes fall below national bottom line. The Mangatī River was the only river to have both sites with all three attributes in band D.

The SQMCI had the most sites fall within band A, but also had the highest proportion of sites failing to achieve national bottom lines across the three metrics assessed. This could reflect the sensitive nature of the SQMCI metric compared to MCI. MCI is calculated using presence-absence data, while SQMCI takes relative abundances into account, therefore any change in the MCI will reflect a loss or addition of taxa at a site, and will always reflect a decline in relative abundances first before taxa decline (i.e., SQMCI will decrease before MCI will decrease). A change in SQMCI value does not inherently mean a change in taxa numbers.

Overall, it is recommended that in the future a comparison of regionally and nationally-derived tolerance values and MCI scores are analysed together to assess similarities and differences within analysis methods.

Regional trends

For long-term trends, eight sites indicated either ‘likely degrading’ or ‘very likely degrading’ trends.

The two Katikara Stream sites (KTK00015 and KTK000248) both indicated a negative trend, with the upper site ‘likely degrading’ and the lower site ‘very likely degrading’. This is likely due to severe headwater erosion events in during 2008/09 which impacted the macroinvertebrate communities in this stream, with subsequent limited recovery in the time following. Other sites, such as STY000300 (‘very likely degrading’), and WGG000150 (‘likely degrading’) also showed negative trends likely impacted by known erosion events in these catchments. The Waiwhakaiho River site (WKH000920, ‘likely degrading’) has had fluxes of decline and recovery but overall indicating a decline in health over time. This pattern could be attributed to an increase in the permitted take of the Hydro Electric Power Scheme (HEPS), among other factors. The lower Tāngāhoe site (TNH000515) showed a ‘likely degrading’ trend, however the calculated likelihood was at the lower end of the trend category. This site has showed variability in health over time, with improvements followed by declines in MCI health, attributing to an overall degradation shown over the full dataset.

The upper site on the Waimōku Stream (WMK000100) showed a ‘likely degrading’ long-term trend. MCI values for this site have had a moderate range with the minimum and maximum scores differing by 20 units, however scores have usually consistently remained in the ‘very good’ health category. The percent of annual change for this site was only revealing a decrease in MCI scores by 0.05 units annual, which is a small change.

The Mangorei Stream site (MGE000970) showed a ‘very likely degrading’ trend. MCI values for this site have had a relatively wide range, with the minimum and maximum value differing by 29 units. There have been

small fluctuations in MCI score over the entire dataset, which has overall revealed a negative trend over time. This can be seen when looking at all site results (view Appendix V) where there was a higher proportion of sites categorised as 'good' health at the beginning of the monitoring period, whereas from approximately 2011 onward there was a shift to more MCI scores representative of 'fair' health. However, there is a suggestion that this has plateaued over the recent years, as suggested by the change to an 'indeterminate' trend category in the ten-year trends.

When comparing these sites with a long-term degrading trend, seven out of eight sites had a change in trend category either to 'indeterminate', 'likely improving', or 'very likely improving' in the ten-year trend analysis. The Tāngāhoe River site (TNH000515) site was the only site of these eight to remain as 'likely degrading".

Some of the sites in the ten-year trend analysis have plateaued, with 20 sites now showing an 'indeterminate' trend direction, indicating neither a positive or negative trend. This could be due to many reasons, one such being that in some catchments riparian management initiatives have largely been completed and therefore in-stream communities and MCI scores have stabilised at those sites. Additionally, some sites have shown step change improvements due to the removal of point source discharges such as wastewater treatment plant removals, resulting in a new baseline at those sites. There are also factors which could be counteracting improvements, such as increased agricultural inputs or warmer/drier weather. Waterways of note in the ten-year trend analysis were the Kurapete Stream and the Waiongana Stream, where both sites on each stream have degrading trend categories. This could suggest that events have or are occurring in the upper reaches of the catchment, affecting all sites on the stream.

Ten-year trends have also indicated that the number of sites showing 'improving' trends has decreased, while the number of sites showing 'degrading' trends has increased. Since 2013, 18 sites (32%) have likely or very likely deteriorated, compared to only eight sites (14%) showing similar trends over the long-term. Conversely, since 2013, 20 sites (36%) have likely or very likely improved, whereas long-term trends indicate that three-quarters of the sites (42 sites, 75%) were likely or very likely improving. A comparison of how the proportion of these trend categories have changed over time is presented in Figure 8. Fourteen sites with likely or very likely degrading short-term trends were sites that were shown as likely or very likely improving in the long-term trends, suggesting a recent decline in their macroinvertebrate stream communities. Typically, the sites which had healthy in-stream macroinvertebrate communities at the start of the monitoring programme have not shown large improvements in trend analyses. Following this, it is not surprising that sites with long-term trends showing the highest improvements were in relatively poor health at the start of the monitoring programme.

Several of the sites exhibiting negative ten-year trends (either 'likely degrading' or 'very likely degrading') were also sites which were affected by low summer flows in the latest 2023 survey (Appendix III). For these sites, days since a significant flood, specifically a fresh over 7x median flow were particularly high. Samples taken in summer months have often shown poorer MCI results than spring (refer to previous annual reports for spring and summer analyses). This could be due to factors such as decreased habitat space, a reduction of taxa which prefer fast flowing water, and an increase in taxa which prefer slower flowing water (Suren & Jowett, 2006). An analysis from the previous 2018/19 annual report indicated that MCI scores were negatively correlated with the days between sampling and the last significant fresh (when flows go over 3x or 7x median). It was assumed that this was likely due to periphyton and fine sediment deposition accrual as well as an overall decrease in flows overtime due to less rainfall. Significant freshes mobilise the streambed removing periphyton and deposited sediment, which leaves a habitat better suited to macroinvertebrates. Other factors such as nutrients and temperature can have important interactive and antagonistic effects and therefore the importance of the preceding hydrological regime will vary at the site level. The previous 2018/19 annual report indicated that the time between sampling and the last significant fresh had been increasing, which could have influenced trends at some sites.

In the future, investigations into how macroinvertebrate communities have interacted with other stream factors such as periphyton, deposited sediment, and nutrients could be useful when discussing results and trends.

5. Summary

The 2022/23 period was the 28th year of the macroinvertebrate state of the environment (SoE) monitoring programme. This report incorporated new data from the 2019/20 through to 2022/23 monitoring years, and summarises the macroinvertebrate communities at 67 sites established throughout the Taranaki region.

Results are discussed in terms of macroinvertebrate taxa richness and MCI scores using regionally-derived tolerance values, which is compared with prior SoE data. Additionally, to align with national standards, this report also includes MCI, SQMCI and ASPM scores based on nationally-derived tolerance values over the recent five-year period. In-stream health is also assessed using regionally-derived MCI scores to identify long- and short-term trends where possible.

6. Recommendations from the 2018-2019 report

In the 2018/19 report, it was recommended:

1. THAT the freshwater biological macroinvertebrate fauna component of the SoE programme be maintained in the 2019/20 monitoring year by means of the same programme as that undertaken in 2018/19, with some site changes. These changes are namely that five Eastern Hill Country sites be added to the programme to provide improved representation, and that the upper Mangawhero site is removed, as this site has very poor site-specific habitat and is not considered representative of the stream or catchment;
2. THAT temporal trending of the macroinvertebrate faunal data continues to be updated on an annual basis.

7. Recommendations for 2023/24 monitoring period

1. THAT the freshwater biological macroinvertebrate fauna component of the SoE programme be maintained in the 2023/24 monitoring year by means of the same programme as that undertaken in 2018/19, with some site changes. Changes recommended are the addition of sites to increase representation of currently underrepresented FMUs or catchment types (e.g., spring-fed catchments), as well as the review of one established site on the Uruti Stream for appropriateness in the SoE programme;
2. THAT any potential site changes are discussed with iwi/hapū and/or catchment community groups to explore opportunities to incorporate other data streams and/or align monitoring programmes;
3. THAT temporal trending of the macroinvertebrate data continues to be updated on an annual basis;
4. THAT to inform policy implementation and future SoE reporting, an analysis of drivers of macroinvertebrate health be undertaken;
5. THAT a comparison between regionally- and nationally-derived tolerance values and MCI scores be completed to assess similarities between results.

Bibliography and references

Biggs BJF. 2000. *New Zealand Periphyton Guideline: Detecting, Monitoring and Managing Enrichment of Streams*. Prepared for Ministry for the Environment. NIWA, Christchurch, New Zealand. 122 pp.

Biggs BJF and Kilroy C. 2000. *Stream Periphyton Monitoring Manual. Published for Ministry for the Environment*. NIWA, Christchurch, New Zealand. 228 pp.

Collier, K. J. 2008. Average score per metric: an alternative metric aggregation method for assessing wadeable stream health. *New Zealand Journal of Marine and Freshwater Research, 42(4), 367- 378*.

Collier KJ, Clapcott, J, and Neale, M. 2014. *A macroinvertebrate attribute to assess ecosystem health for New Zealand waterways for the national objectives framework – issues and options*. Environmental Research Institute report 36, University of Waikato, Hamilton.

Collier KJ, Winterbourn MJ. 2000 (eds.). *New Zealand stream invertebrates: ecology and implications for management*. NZ Limnological Society, Christchurch. 415pp.

Clapcott J, Wagenhoff A, Neale M, Storey R, Smith B, Death R, Harding J, Matthaei C, Quinn J, Collier K, Atalah J, Goodwin E, Rabel H, Mackman J, Young R. 2017. *Macroinvertebrate metrics for the National Policy Statement for Freshwater Management. Prepared for the Ministry for the Environment*. Cawthron Report No. 3073. 139 p. plus appendices.

Death RG. 2000. Invertebrate-substratum relationships. In: Collier KJ, Winterbourn MJ. eds. *New Zealand stream invertebrates: ecology and implications for management*. New Zealand Limnological Society, Christchurch. Pp 157-178.

Fowles CR. 2014. *Baseline biomonitoring of lower reach sites in three intensive dairying southwestern ring plain catchments (Heimama, Hiniwera, and Mangatawa Streams), surveyed January 2014*. Taranaki Regional Council Internal Report CF598.

Graham, E., Matheson, F., Williams, E., & Rickard, D. 2020: Trends analysis for selected indicators of Waikato River health and wellbeing 2010-2019. Prepared for Waikato River Authority. NIWA Client Report 2021151HN. 173pp.

LAWA Factsheet: Calculating water quality trends in rivers and lakes. (2023). Cawthron. https://www.lawa.org.nz/learn/factsheets/calculating-water-quality-trends-in-rivers-and-lakes/

Leathwick J, Julian K, and Smith B. 2009. *Predicted national-scale distributions of freshwater macroinvertebrates in all New Zealand's rivers and streams*. NIWA Client Report HAM2009-042. 69pp.

McBride G.B. 2019. Has water quality improved or been maintained? A quantitative assessment procedure. *Journal of environmental quality, 48(2), pp.412-420*.

Ministry for the Environment. 2022. *National Policy Statement for Freshwater Management 2022*: Accessed August 2023.

NEMS. 2022. *National Environmental Monitoring Standards Macroinvertebrates Collection and Processing of Macroinvertebrate Samples from Rivers and Streams, Version: 1.0.0*.

Piggott JJ, Townsend CR and Matthaei CD. 2015. Climate warming and agricultural stressors interact to determine stream macroinvertebrate community dynamics. *Global change biology, 21(5): 1887-1906*.

Ryan PA. 1991. Environmental effects of sediment on New Zealand streams, a review. *NZ Journal of Marine and Freshwater Research, Vol 25, 207-221*.

Shearer K and James T. 2020. *Effects of the 2019 drought on aquatic ecology in selected waterways in Golden Bay*.

Snelder T, Biggs B, Weatherhead M. 2004. *New Zealand River Environment Classification User Guide*. MfE publication. 145p. Prepared for Tasman District Council. Cawthron Report No. 3361. 22 p. plus appendices.

Snelder T, Fraser C, Larned S and Whitehead A. 2021. *Guidance for the analysis of temporal trends in environmental data*. Prepared for Horizons Regional Council and MBIE Envirolink. NIWA Client Report 2021017WN. 99pp.

Stark JD. 1985. *A macroinvertebrate community index of water quality for stony streams*. Water and Soil Miscellaneous Publication No. 87.

Stark JD. 1998. SQMCI: a biotic index for freshwater macroinvertebrate coded abundance data. *New Zealand Journal of Marine and Freshwater Research 32(1):* 55-66.

Stark JD. 1999. *An evaluation of Taranaki Regional Council's SQMCI biomonitoring index*. Cawthron Report No. 472. 32pp.

Stark JD. 2003. *The water quality and biological condition of the Maketawa catchment*. Cawthron Report No 742. 70pp.

Stark JD; Boothroyd IKG. 2000. Use of invertebrates in monitoring. In Collier KJ, Winterbourn MJ. eds. *New Zealand Stream Invertebrates: ecology and implications for management*. NZ Limnological Society, Chch. Pp 344-373.

Stark JD, Boothroyd IKG, Harding JS, Maxted JR and Scarsbrook MR. 2001. *Protocols for sampling macroinvertebrates in wadeable streams*. New Zealand Macroinvertebrate Working Group Report No 1. Prepared for Ministry for the Environment. Sustainable Management Fund Project No 5103 57p.

Stark JD and Fowles CR. 2006. *An approach to the evaluation of temporal trends in Taranaki state of the environment macroinvertebrate data*. Cawthron Institute Report No 1135. 88p.

Stark JD and Fowles CR. 2009. *Relationships between MCI, site altitude, and distance from source for Taranaki ring plain streams*. Stark Environmental Report No 2009-01 47p.

Stark JD and Fowles CR. 2015. *A re-appraisal of MCI tolerance values for macroinvertebrates in Taranaki ringplain streams*. Stark Environmental Report No 2015-03 38p.

Stark JD and Maxted JR. 2007. *A user guide for the MCI*. Cawthron Report No 1166. 56p.

Suren AM and Jowett IG. 2006. Effects of floods versus low flows on invertebrates in a New Zealand gravel-bed river. *Freshwater Biology, 51(12), 2207-2227*.

Taranaki Catchment Commission. 1984. *Freshwater biology, Taranaki ring plain water resources survey*. Taranaki Catchment Commission Report. 196p.

Taranaki Regional Council. 1994. *Regional Policy Statement for Taranaki*. Taranaki Regional Council.

Taranaki Regional Council. 1995a. *Freshwater macroinvertebrate community data: a review of the results of biomonitoring surveys undertaken between 1980 and 1995*. Taranaki Regional Council internal report.

Taranaki Regional Council. 1995b. *Regional Monitoring Strategy for Taranaki Part II: Proposed State of the Environment Monitoring Programme*. Taranaki Regional Council internal report.

Taranaki Regional Council. 1996a. *State of the environment regional water quality monitoring network for Taranaki*. Biological sampling techniques for freshwater rivers and streams. Taranaki Regional Council internal report.

Taranaki Regional Council. 1996b. *State of the Environment - Taranaki Region 1996*. Taranaki Regional Council.

Taranaki Regional Council. 1997a. *State of the Environment Procedures Document*. Taranaki Regional Council internal report.

Taranaki Regional Council. 1997b. *State of the Environment regional water quality monitoring network for Taranaki: Biological sampling techniques for freshwater rivers and streams*. Taranaki Regional Council internal report.

Taranaki Regional Council. 1997c. *Annual SEM Report 1995-96 Fresh water biological monitoring programme*. Technical report 97-96.

Taranaki Regional Council. 1998. *Freshwater biological monitoring programme Annual SEM Report 1996-97*. Technical Report 97-100.

Taranaki Regional Council. 1999. *Freshwater biological monitoring programme Annual SEM Report 1997-98*. Technical Report 99-06.

Taranaki Regional Council. 2000. *Fresh water biological monitoring programme Annual SEM Report 1998-99*. Technical Report 99-90.

Taranaki Regional Council. 2001. *Fresh water biological monitoring programme Annual SEM Report 1999-2000*. Technical Report 2000-40.

Taranaki Regional Council. 2002a. *Fresh water biological monitoring programme Annual SEM Report 2000-2001*. Technical Report 2001-87.

Taranaki Regional Council. 2002b. *Fresh water biological monitoring programme Annual SEM Report 2001-2002*. Technical Report 2002-46.

Taranaki Regional Council. 2003a. *Taranaki – Our Place, Our Future, Report on the state of the environment of the Taranaki region – 2003*. Taranaki Regional Council, 206pp.

Taranaki Regional Council. 2003b. *Fresh water biological monitoring programme Annual SEM Report 2002-2003*. Technical Report 2003-18.

Taranaki Regional Council. 2004a. *Fresh water biological monitoring programme Annual SEM Report 2003-2004*. Technical Report 2004-23.

Taranaki Regional Council. 2005. *Fresh water biological monitoring programme Annual SEM Report 2004-2005*. Technical Report 2005-72.

Taranaki Regional Council. 2006a. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report 2005-2006*. Technical Report 2006-94.

Taranaki Regional Council, 2006b: An interpretation of the reasons for statistically significant temporal trends in macroinvertebrate (MCI) SEM data in the Taranaki region 1995-2005. Taranaki Regional Council Internal Report.

Taranaki Regional Council. 2006c. *A review of macroinvertebrate monitoring data for large hill country catchments in the Taranaki region*. Taranaki Regional Council Internal Report.

Taranaki Regional Council. 2007a. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report 2006-2007*. Technical Report 2007-22.

Taranaki Regional Council. 2007b. *Taranaki Regional Council freshwater biology methods manual Version 3*. Taranaki Regional Council Internal Report.

Taranaki Regional Council. 2008. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report 2007-2008*. Technical Report 2008-75.

Taranaki Regional Council. 2009a. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2008–2009*. Technical Report 2009-14.

Taranaki Regional Council. 2009b. *Taranaki-Where We Stand. State of the environment report*. Taranaki Regional Council, 282 p.

Taranaki Regional Council. 2010. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2009–2010*. Technical Report 2010-16.

Taranaki Regional Council. 2011a. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2010–2011*. Technical Report 2011-38.

Taranaki Regional Council. 2011b. *Freshwater physicochemical programme: State of the Environment Monitoring Annual Report 2010-2011*. Technical Report 2011-47.

Taranaki Regional Council. 2012a. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2011–2012*. Technical Report 2012-18.

Taranaki Regional Council. 2012b. *Freshwater physicochemical programme: State of the Environment Monitoring Annual Report 2011-2012*. Technical Report 2012-27.

Taranaki Regional Council. 2013a. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2012–2013*. Technical Report 2013-48.

Taranaki Regional Council. 2013b. *Freshwater physicochemical programme: State of the Environment Monitoring Annual Report 2012-2013*. Technical Report 2013-49.

Taranaki Regional Council. 2014a. *Freshwater physicochemical programme: State of the Environment Monitoring Annual Report 2013-2014*. Technical Report 2014-23.

Taranaki Regional Council. 2014b. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2013–2014*. Technical Report 2014-28.

Taranaki Regional Council. 2015a. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2014–2015*. Technical Report 2015-66.

Taranaki Regional Council. 2015b. *Taranaki - as one. State of the environment report 2015*. Taranaki Regional Council, 267p.

Taranaki Regional Council. 2016. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2015–2016*. Technical Report 2016-33.

Taranaki Regional Council. 2017. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2016–2017*. Technical Report 2017-88.

Taranaki Regional Council. 2018. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2017–2018*. Technical Report 2018-61.

Taranaki Regional Council. 2019. *Fresh water macroinvertebrate fauna biological monitoring programme Annual SEM Report: 2018-2019*. Technical Report 2019-52.

Taranaki Regional Council. 2019. *A brief statistical summary of Taranaki freshwater macroinvertebrate surveys for the period January 1980 to July 2019*. Taranaki Regional Council internal report.

Wilcock RJ, Betteridge K, Shearman D, Fowles CR, Scarsbrook MR, Thorrold BS and Costall D. 2009. Riparian protection and on-farm best management practices for restoration of a lowland stream in an intensive dairy farming catchment: a case study. *New Zealand Journal of Marine and Freshwater Research 43: 803-818*.

Appendix I

History of site selection

Evaluations of the effects of, and recovery from, extensive erosion in the headwaters of the Waiaua River were included in this programme. These surveys commenced in December 1998, with the two sites on the Waiaua River incorporated into the SOE biological monitoring programmes once the initial documentation of the effects and recovery was established. This river has continued to be affected by headwater erosion in more recent years, leading to a review of the programme in 2006, after which the Waiaua River was excluded from the SOE programme. The Kurapete Stream (upstream and 5.5km downstream of the Inglewood oxidation pond system) has been monitored throughout the SOE period, using the appropriate SOE protocols, and thus has been recently included in the programme. Two additional sites in the Waiwhakaiho River catchment were included in 2002-2003 in recognition of the importance of this major catchment. A further two additional eastern hill country sites in the Whenuakura and Waitara Rivers were added to the programme in 2015-2016 to improve the representativeness of the monitoring programme.

Two sites in the Maketawa Stream were also added because of a commitment to continue the documentation of conditions in this catchment following the investigation of baseline water quality conditions during the 2000-2002 period (Stark, 2003). Three sites in the Tangahoe River were established in the 2007-2008 period for the purposes of monitoring land use changes (afforestation) in an eastern hill country catchment. The two sites in the Waiokura Stream were also added in the 2007-2008 period as a long term monitoring commitment to the collaborative best practice dairying catchment project. One site in the Herekawe Stream (a long-term consent monitoring site) was incorporated into the programme in the 2008-2009 period for the purpose of monitoring the local initiatives of walkway establishment and riparian planting of this small catchment on the western outskirts of the New Plymouth urban area.

The Hangatahua (Stony) River was selected for the SOE programme as a waterway of high conservation value. The headwaters of the river are the Ahukawakawa swamp within Te Papakura o Taranaki, and several tributaries that begin above the tree line on the north-west of Mount Taranaki. Once the river leaves the National Park boundary its catchment becomes very narrow so that it receives little water from surrounding farmland before reaching the sea. This factor and the protection order on the catchment maintains good water quality in the river. However, ecological degradation occurs from time to time after headwater erosion events when sedimentation and scouring of the riverbed may be particularly severe. The sites at Mangatete Road and State Highway 45 are approximately seven kilometres and 12km downstream of the National Park boundary respectively.

The Timaru and Mangaoraka Streams were chosen for the SOE programme as examples of streams within primary agricultural catchments. The Timaru Stream arises within the National Park boundary, near the peak of Pouakai, in the Pouakai Range. Upon leaving this range, the stream flows along the edge of the Kaitake Range (also part of the National Park) and receives several tributaries that flow through adjacent agricultural land. From the edge of the Kaitake Range, the stream flows north through agricultural land to the sea. Carrington Road crosses the stream within the National Park boundary and State Highway 45 is six kilometres downstream of the confluence with the first farmland tributary. The Mangaoraka Stream rises below the National Park boundary near Egmont Road and flows north through farmland for its entire length before joining the Waiongana Stream near the coast. Corbett Road is 26km downstream of the source.

The Waiongana Stream was included in the SOE programme as an example of a stream with a major water abstraction. The stream originates within the National Park, near the North Egmont visitor's centre. After crossing the park boundary, it flows northeast through agricultural land to the sea. State Highway 3a crosses the stream fifteen kilometres downstream of the National Park boundary, and the intake for the Waitara industrial water supply is a further five kilometres downstream of that. Devon Road is 30km downstream of the National Park boundary.

The Waiwhakaiho, Manganui, Waitara, and Mangaehu Rivers were selected for the SOE programme as examples of waterways with large catchments and multiple impacts from human land uses including

plantation forestry, rural, urban and industrial activities. They arise either on Mt Taranaki or in the eastern hill country, before flowing across the ring plain.

The Waiwhakaiho River and its headwater tributaries arise above the tree line on the north face of Mount Taranaki. Upon leaving the National Park, the river flows north through agricultural and industrial land for 27km to the sea. The river passes under State Highway 3 near Egmont Village, nine kilometres downstream of the National Park boundary. The sites at Constance Street and adjacent to Lake Rotomanu are included in the lower Waiwhakaiho River industrial discharges monitoring programme. The site adjacent to Lake Rotomanu has replaced the site immediately downstream of the Mangaone Stream that was used in the 1995-1996 State of the Environment monitoring survey. This allows the State of the Environment monitoring programme to better integrate with the industrial monitoring programme. The Mangorei Stream is the principal tributary catchment in the lower reaches, downstream of the major abstraction of water for hydroelectric and community supply purposes. Occasional headwater erosion events have been documented in the upper river with an instance of severe (orange) discolouration in spring 2014 due to release of naturally occurring iron oxide from a small headwater tributary.

The source of the Manganui River is situated above the tree line on the eastern slopes of Mount Taranaki. After leaving the National Park, the river flows east and then north through agricultural land for 44km before joining the Waitara River. State Highway 3 is eight kilometres downstream of the National Park boundary. At Tariki Road, much of the flow of the Manganui River is diverted through the Motukawa hydroelectric power scheme to the Waitara River. Therefore, except when the Tariki weir is overtopping, most of the water in the Manganui River at Bristol Road (14km downstream of the diversion) comes from tributaries such as the Mangamawhete, Waitepuke, Maketawa, and Ngatoro Streams. Like the Manganui River, these streams originate high on the eastern slopes of Mount Taranaki. They flow through agricultural land before joining the river. The Maketawa Stream provides a valued trout and native fish habitat. Sites were included in the upper and lower reaches of the stream.

The small Kurapete Stream, which rises as seepage to the west of Inglewood, was included to monitor trends in relation to the removal of the discharge from the town's Wastewater Treatment Plant from this tributary of the lower Manganui River in 2000. Sites were included upstream and nearly six km downstream of where the discharge was located.

The Waitara River flows south-west and then north-west out of the eastern hill country through a mix of agricultural land and native forest before passing through the town of Waitara and out to sea. It has a different character from the steep ring plain rivers and carries a high silt load. The Autawa Road site is located 46km from the coast. This site was added only during the 2015-2016 reporting period, to increase the number of eastern hill country sites being monitored. The Mamaku Road site is located six kilometres upstream of the coast above any tidal influence. This site is also part of the monitoring programme for the stormwater discharge from the Waitara Valley Methanex plant to the Waitara River.

The Mangaehu River originates in the eastern hill country and flows south-west through agricultural land for most of its length before joining the Patea River, ten kilometres upstream of Lake Rotorangi. Raupuha Road crosses the river less than one kilometre upstream of the confluence with the Patea River.

The Tangahoe River is a smaller eastern hill country catchment which flows through agricultural land, some of which has undergone afforestation in the upper reaches. Fonterra extracts dairy company processing waters in the lower reaches near the coast, south of Hawera township.

The Whenuakura River is an eastern hill country river which primarily flows through agricultural land. It has a high silt load and is consequently highly turbid. The only site located on the Whenuakura River was at Nicholson Road. This was included from 2015-2016 onwards to increase the number of eastern hill country rivers being monitored.

The Mangati Stream was chosen for the SOE programme as an example of a small, degraded stream. Only five kilometres in length, the stream rises in farmland and flows north through the Bell Block industrial area and suburbs to the sea. The site downstream of the railway line is upstream of all industrial discharges to the stream. The site at Te Rima Place is located within a suburban park, downstream of all Bell Block industrial discharges. Both sites are part of the Mangati Stream industrial monitoring programme.

The Waimoku Stream originates in Te Papakura o Taranaki where it flows down Lucy's Gully in the Kaitake Ranges. Once the stream leaves the park it flows through farmland for three and a half kilometres, and through the coastal township of Oakura for about 200m, before entering the sea. It was included in the SOE programme in the 1999-2000 monitoring year to monitor the effects of a riparian planting programme in the catchment. Sampling sites are located in Lucy's Gully under native forest, and in Oakura township, about 100m upstream of the sea.

The Waiau Stream originates in farmland near Tikorangi, and is a small catchment to the north of the Waitara River. It flows for 12.5km to the sea. The stream was included in the SOE programme in the 1999-2000 monitoring year as an example of a northern lowland catchment. The sampling site at Inland North Road is located in a pasture setting.

The Punehu Stream is representative of a south-western Taranaki catchment subject primarily to intensive agricultural land use with water quality affected by diffuse source run-off and point source discharges from dairy shed treatment pond effluents particularly in the Mangatawa Stream, a small lower reach tributary. No industrial discharges to the stream system are known to occur. Both sites were Taranaki ring plain survey sites (TCC, 1984) and the lower site near the coast remains a NIWA hydrological recording station as a representative basin. The upstream site is representative of relatively unimpacted stream water quality although it lies approximately two km below the National Park boundary.

The small seepage fed, ringplain Waiokura Stream drains an intensively dairy-farmed catchment. The Fonterra, Kapuni factory irrigates wastewater within the mid reaches of this catchment. The catchment is the subject of a collaborative long term study of best practice dairying in five New Zealand catchments (Wilcock et al, 2009).

The Patea River rises on the eastern slopes of Mt Taranaki, within the National Park and is a trout fishery of regional significance, particularly upstream of Lake Rotorangi (formed by the Patea dam) in its mid reaches. Site 1 (at Barclay Road) is representative of the upper catchment adjacent to the National Park above agricultural impacts. Site 2 (at Swansea Road), which is integrated with consent compliance monitoring programmes, was also a ring plain survey site, and is representative of developed farmland drainage and is downstream of Stratford township (urban run-off, but upstream of the rubbish tip and oxidation pond discharges and the combined cycle power station discharge). Site 3 (at Skinner Road) is an established hydrological recorder station downstream of these discharges and the partly industrialised Kahouri Stream catchment.

The Waingongoro River rises on the south-eastern slopes of Mount Taranaki within the National Park and is one of the longest of the ring plain rivers, with a meandering 67km of river length from the National Park boundary prior to entering the Tasman Sea at Ohawe Beach. The river is the principal trout fishery in Taranaki, is also utilised for water abstraction purposes, and up until mid-2010, received treated industrial and municipal wastes discharges in mid-catchment at Eltham. Site 1 (near the National Park boundary) is representative of high water quality conditions with minimal agricultural impacts. Site 2, six kilometres further downstream (at Opunake Road) represents agricultural impacts, still in the upper reaches of the river. Site 3, (at Eltham Road) a further 16km downstream remains representative of the impacts of farmland drainage and some water abstraction while upstream of the former major Eltham point source discharges from a meatworks and the municipal wastewater treatment plant. The meatworks wastewaters were diverted to spring and summer land irrigation in the mid-2000s and treated plant wastewater subsequently has been irrigated onto farmland in this manner. The Eltham municipal wastes were permanently diverted

by pipeline to Hawera in June 2010. The Stuart Road site, a further six kilometres downstream is located below these former discharges. A further two sites (SH45 and Ohawe Beach) are located 33km and 37km downstream of Stuart Road in the intensively developed farmland lower reaches of the catchment. River flow recording sites are located at Eltham Road and SH45.

The Mangawhero Stream is a relatively small, swamp-fed catchment rising to the east of Eltham in the Ngaere Swamp and draining developed farmland. The upper site is located in the mid reaches of the stream upstream of the former point source discharge from the Eltham municipal wastewater treatment plant while the lower site is located a further three kilometres downstream, below the Mangawharawhara Stream confluence, near the confluence with the Waingongoro River. Apart from the municipal point source discharge, which was diverted out of the stream in July 2010 (see above), the catchment is predominantly developed farmland.

The Huatoki Stream was sampled as part of the State of the Environment monitoring programme for the first time in the 1997-1998 monitoring year. The stream rises one kilometre outside the National Park boundary on the foothills of the Pouakai Range. It flows through agricultural land for 12.5 kilometres to the outskirts of New Plymouth where it enters native forest reserve. The stream flows for four and a half kilometres alongside walkways and beneath the central business district of New Plymouth before entering the sea next to Puke Ariki Landing. Within New Plymouth it flows through a culvert in a flood retention dam and over a small weir in the Huatoki Reserve prior to the business section of the city. Beautification works adjacent to 'Centre City' near the stream mouth (in 2010) involved the creation of a weir and fish pass immediately upstream of the lowest site which subsequently has altered the flow regime at this site and created a run-like habitat with intermittent flow variability rather than the previous riffle habitat.

The Herekawe Stream is a small seepage stream on the western boundary of New Plymouth. It drains a mainly urban catchment and receives stormwater discharges particularly in its lower reaches. Completion of a walkway and riparian planting community project now warrants the inclusion of the consent monitoring 'control' site at Centennial Drive for monitoring the effectiveness of these initiatives.

The Kaupokonui River rises on the southern slopes of Mt Taranaki within the National Park. It drains an intensively farmed dairy catchment. The principal point source discharges to the river occur in the mid-reaches from the Kaponga oxidation pond system, and cooling water from NZMP (Kapuni) Ltd. The river has patchy riparian vegetation cover and has been targeted for intensive riparian management initiatives. Site 1 is two and a half kilometres downstream of the National Park boundary and has high water quality, with minor agricultural impacts. Toward the mid-reaches, site 2 (six kilometres further downstream) is subject to some agricultural impacts, but is a short distance upstream of the Kaponga oxidation ponds' system discharge. A further six kilometres downstream, site 3 is upstream of wastes irrigation, cooling water discharges and factory abstraction. The Upper Glenn Road (site 4) is a further 10km downstream, below all of the factory's activities and is a river flow hydrological recording site. The final site 5, is located near the mouth of the river, five kilometres below site 4, upstream of any tidal influence at Kaupokonui beach domain camping ground.

Two western catchments, the Katikara Stream and Kapoaiaia Stream, were included in the programme to monitor trends in relation to riparian planting. Such riparian planting initiatives have been concentrated in certain catchments where past riparian vegetation has been sparce. The Katikara Stream rises on the western slopes of Mt Taranaki, passing through primarily agricultural land in the relatively short distance to the sea. The Kapoaiaia Stream also rises from Mt Taranaki on the western side and south of the Katikara Stream. The Kapoaiaia Stream drains agricultural land throughout its entire catchment below the National Park boundary, passing through Pungarehu township at SH45 before entering the sea at Cape Egmont. A hydrological telemetry recorder is located at Cape Egmont

More recently, several sites have been established in the SoE macroinvertebrates programme in response to the NPS-FM 2020, which recommends sufficient sampling within each FMU developed by the Council.

Should monitoring find that the macroinvertebrate communities within an FMU or part of an FMU are degraded or degrading, the Council is required to take action to halt or reverse degradation. These new sites in the SoE programme were added to improve monitoring within underrepresented FMUs.

Appendix II

Predictive MCI scores for REC class, altitude, and distance alongside current 2022/23 regionally-derived MCI results

Predictive MCI scores for REC class, altitude and distance from national park, alongside current 2022/23 regionally-derived MCI results. KM=kilometres from national park

River/stream	Site code	MCI 2023	REC		Distance	
			CLASS	MCI	KM	MCI
Herekawe Stream	HRK000085	94	WW/L/VA/U/MO/MG	89	N/A	N/A
Huatoki Stream	HTK000350	101	WX/L/VA/P/MO/LG	95	N/A	N/A
	HTK000425	108	WW/L/VA/P/MO/LG	92	N/A	N/A
	HTK000745	87	WW/L/VA/U/MO/MG	93	N/A	N/A
Kapoaiaia Stream	KPA000250	127	CX/H/VA/P/MO/MG	111	5.7	112
	KPA000700	112	CX/H/VA/P/MO/MG	105	13.5	103
	KPA000950	95	CX/L/VA/P/MO/LG	99	25.2	96
Kaūpokonui River	KPK000250	135	CX/H/VA/IF/MO/MG	137	3.3	118
	KPK000500	128	CX/H/VA/P/MO/MG	127	9.2	107
	KPK000660	109	CX/H/VA/P/MO/LG	122	15.5	101
	KPK000880	100	CW/H/VA/P/MO/LG	106	25.7	95
	KPK000990	90	CW/L/VA/P/HO/LG	96	31.1	93
Kurapete Stream	KRP000300	100	WX/L/VA/P/LO/LG	92	N/A	N/A
	KRP000660	104	WW/L/VA/P/LO/LG	102	N/A	N/A
Katikara Stream	KTK000150	145	CW/L/VA/P/HO/LG	131	0	132
	KTK000248	94	WX/L/VA/P/MO/LG	96	18.1	99
Makara Stream	MAA000900*	92	WW/L/SS/P/MO/MG	-	N/A	N/A
Mangorei Stream	MGE000970	93	CX/L/VA/P/MO/LG	101	15.6	101
Mangaehu River	MGH000950	104	CW/L/SS/P/HO/LG	117	N/A	N/A
Manganui River	MGN000195	136	CX/H/VA/P/MO/LG	124	8.7	107
	MGN000427	110	CX/L/VA/P/HO/MG	103	37.9	91
Mangati Stream	MGT000488	84	WN/L/VA/P/LO/LG	80	N/A	N/A
	MGT000520	58	WW/L/VA/U/LO/LG	88	N/A	N/A
Makuri Stream	MKR000495*	102	WW/L/SS/P/MO/LG	-	N/A	N/A
Maketawa Stream	MKW000200	133	CX/H/VA/IF/MO/MG	130	2.3	121
	MKW000300	108	CX/H/VA/P/MO/LG	111	15.5	101
Moumahaki Stream	MMK000050*	78	WW/L/SS/P/MO/LG	-	N/A	N/A
Mangaoreti Stream	MNT000950*	80	WW/L/SS/P/LO/LG	-	N/A	N/A
Mangaoraka Stream	MRK000420	93	WW/L/VA/P/MO/LG	92	N/A	N/A
Mangaroa Stream	MRO000210*	78	WD/L/VA/P/MO/LG	-	N/A	N/A
Matau Stream	MTA000068*	108	CW/L/SS/P/LO/MG	-	N/A	N/A
Mangawhero Stream	MWH000490	101	CN/L/VA/P/MO/LG	93	N/A	N/A
Pātea River	PAT000200	145	CX/H/VA/IF/MO/MG	129	1.9	125
	PAT000315	120	CX/H/VA/P/MO/LG	112	12.4	103
	PAT000360	103	CW/L/VA/P/HO/LG	109	19.2	99
Pūnehu Stream	PNH000200	124	CX/H/YA/IF/MO/MG	121	4.4	115
	PNH000900	115	CW/L/VA/P/MO/LG	100	20.9	98
Stony (Hangatahua) River	STY000300	108	CX/H/VA/S/MO/MG	128	7.3	109
	STY000400	128	CX/H/VA/S/MO/MG	115	12.5	103
Timaru Stream	TMR000150	131	CX/H/VA/IF/LO/HG	141	0	132
	TMR000375	116	CX/L/VA/P/MO/MG	117	10.9	105
Tāngāhoe River	TNH000090	114	WW/L/SS/P/MO/LG	110	N/A	N/A
	TNH000200	109	WW/L/SS/P/HO/LG	108	N/A	N/A
	TNH000515	94	WW/L/SS/P/HO/LG	95	N/A	N/A
Uruiti River	URU000198*	77	WW/L/SS/P/MO/LG	-	N/A	N/A

River/stream	Site code	MCI 2023	REC		Distance	
			CLASS	MCI	KM	MCI
Waiau Stream	WAI000110	97	WW/L/VA/P/MO/LG	91	N/A	N/A
Waiau Stream (2)	WIU000700*	-	WD/L/VA/P/MO/LG	-	N/A	N/A
Waiongana Stream	WGA000260	98	CX/L/VA/P/MO/LG	99	16.1	100
	WGA000450	88	WW/L/VA/P/MO/LG	88	31.2	93
Waingongoro River	WGG000115	140	CX/H/VA/IF/LO/MG	131	0.7	132
	WGG000150	127	CX/H/VA/P/LO/MG	124	7.2	110
	WGG000500	107	CW/L/VA/P/MO/LG	110	23	97
	WGG000665	106	CW/L/VA/P/HO/MG	102	29.6	94
	WGG000895	98	CW/L/VA/P/HO/LG	92	63	85
	WGG000995	93	CW/L/VA/P/HO/MG	95	66.6	85
Waiwhakaiho River	WKH000100	136	CX/H/VA/IF/LO/HG	137	0	132
	WKH000500	105	CX/H/VA/P/MO/MG	115	10.6	105
	WKH000920	98	CX/H/VA/P/HO/LG	97	26.6	95
	WKH000950	91	CX/H/VA/P/HO/LG	97	28.4	94
Waiokura Stream	WKR000500	117	WW/L/VA/P/MO/LG	97	N/A	N/A
	WKR000700	109	WW/L/VA/P/MO/LG	95	N/A	N/A
Waimoku Stream	WMK000100	133	WW/L/VA/P/LO/HG	128	0	132
	WMK000298	96	WW/L/VA/P/MO/MG	103	4	116
Whenuakura River	WNR000450	-	WW/L/SS/P/HO/LG	109	N/A	N/A
Waikaramarama Stream	WMR000100*	98	WW/L/SS/P/LO/LG	-	N/A	N/A
Waitara River	WTR000540	-	WX/L/SS/P/HO/LG	110	N/A	N/A
	WTR000850	80	WX/L/SS/P/HO/LG	98	N/A	N/A

Appendix III

Temperatures and duration since freshes at sampling sites in the 2022/23 biomonitoring year

Duration since freshes at sampling sites in the 2023 SoE biomonitoring year using continuous hydrological flow records, with flow assessments extrapolated from nearby catchments for sites where flow recorders did not exist. NB: () = extrapolation from nearby catchment

River/stream	Site	Site code	Temp ˚C	2023 Survey (days after flow above)	
				3 x median	7 x median
Herekawe Stream	Centennial Drive	HRK000085	16.2	(16)	(92)
Huatoki Stream	Hadley Drive	HTK000350	18.3	(16)	(92)
	Huatoki Domain	HTK000425	16.5	(16)	(92)
	Molesworth St	HTK000745	-	(16)	(92)
Kapoaiaia Stream	Wiremu Road	KPA000250	14.2	16	19
	Wataroa Road	KPA000700	14.7	16	19
	Cape Egmont	KPA000950	16.4	16	19
Kaupokonui River	Opunake Road	KPK000250	13.1	9	10
	U/S Kaponga oxi ponds	KPK000500	14.7	9	10
	U/S Lactose Co.	KPK000660	14.6	9	10
	Upper Glenn Road	KPK000880	16.8	9	10
	Near mouth	KPK000990	16.6	9	10
Kurapete Stream	U/S Inglewood WWTP	KRP000300	14.2	(7)	(8)
	D/S Inglewood WWTP	KRP000660	13.7	(7)	(8)
Katikara Stream	Carrington Road	KTK000150	13.4	(14)	(14)
	Beach	KTK000248	21.9	(14)	(14)
Makara Stream	120m U/S confluence with Waitara River	MAA000900*	20.4	(15)	(15)
Mangorei Stream	SH3	MGE000970	15.5	(7)	(29)
Mangaehu River	Raupuha Road	MGH000950	18.9	20	22
Manganui River	SH3	MGN000195	12.4	8	9
	Bristol Road	MGN000427	13.9	6	7
Mangati Stream	D/S Railway line	MGT000488	14.8	(9)	(21)
	Te Rima Place, Bell Block	MGT000520	15.2	(9)	(21)
Makuri Stream	30m D/S Raupuha Road	MKR000495*	16.3	(20)	(22)
Maketawa Stream	Opp Derby Road	MKW000200	12.9	(21)	(22)
	Tarata Road	MKW000300	13.9	(21)	(22)
Moumahaki Stream	Moumahaki at Johnston Road	MMK000050*	19.3	(26)	(28)
Mangaoreti Stream	U/S of Avenue Rd Bridge	MNT000950*	-	(9)	(9)
Mangaoraka Stream	Corbett Road	MRK000420	-	(25)	(81)
Mangaroa Stream	Vanners landfarm, Lower Ball Road	MRO000210*	19.7	(16)	(18)
Matau Stream	U/S confluence with unnamed trib.	MTA000068*	16.2	(15)	(15)
Mangawhero Stream	D/S Mangawharawhara S	MWH000490	13.7	(8)	(97)
Pātea River	Barclay Road	PAT000200	11.7	8	30
	Swansea Road	PAT000315	14.5	8	30
	Skinner Road	PAT000360	16.0	8	30
Punehu Stream	Wiremu Road	PNH000200	14.5	8	19
	SH45	PNH000900	14.9	8	19
Stony (Hangatahua) River	Mangatete Road	STY000300	19.3	(14)	(14)
	SH45	STY000400	19.5	(14)	(14)
Timaru Stream	Carrington Road	TMR000150	14.0	(14)	(14)
	SH45	TMR000375	18.3	(14)	(14)
Tangahoe River	Upper Valley	TNH000090	18.4	(18)	(19)
	Tangahoe Vly Rd bridge	TNH000200	16.4	(18)	(19)
	D/S rail bridge	TNH000515	17.0	(18)	(19)

River/stream	Site	Site code	Temp ˚C	2023 Survey (days after flow above)	
				3 x median	7 x median
Uruti River	SH3 Bridge	URU000198*	-	(9)	(9)
Waiau Stream	Inland North Road	WAI000110	-	(10)	(10)
Waiau Stream (2)	Approx 1.2 km U/S of Hawkin Road	WIU000700*	-	-	-
Waiongana Stream	SH3a	WGA000260	14.3	7	11
	Devon Road	WGA000450	15.7	7	11
Waingongoro River	700m D/S Nat Park	WGG000115	12.2	7	10
	Opunake Road	WGG000150	13.5	7	10
	Eltham Road	WGG000500	15.4	7	10
	Stuart Road	WGG000665	15.8	7	10
	SH45	WGG000895	16.1	10	11
	Ohawe Beach	WGG000995	16.6	9	10
Waiwhakaiho River	National Park	WKH000100	11.2	8	9
	SH3 (Egmont Village)	WKH000500	15.9	26	40
	Constance St (NP)	WKH000920	14.5	7	9
	Adjacent to L Rotomanu	WKH000950	14.2	7	9
Waiokura Stream	Skeet Road	WKR000500	13.9	(13)	(152)
	Manaia Golf Course	WKR000700	15.0	(13)	(152)
Waimoku Stream	Lucy's Gully	WMK000100	14.6	(14)	(14)
	Beach	WMK000298	17.1	(14)	(14)
Whenuakura River	Nicholson Road	WNR000450	-	-	-
Waikaramarama Stream	D/S of first bridge	WMR000100*	-	(9)	(9)
Waitara River	Autawa Road	WTR000540	-	-	-
	Mamaku Road	WTR000850	19.9	20	78

Appendix IV

Current 2022/23 MCI and taxa richness results alongside historic data

Current regionally derived MCI and taxa richness results and regional bands from the 2022-2023 monitoring year, alongside historic taxa richness and MCI data

River	Site	n	SOE Data 1995-2022				SOE Data 2022- 2023		
			Taxa No.		TRC MCI		Taxa No.	TRC MCI	TRC Grade
			Range	Median	Range	Median			
Herekawe Stream	HRK000085	53	13-29	18	68-100	89	17	94	Fair
Huatoki Stream	HTK000350	51	19-34	25	79-115	99	23	101	Good
	HTK000425	51	17-32	25	90-117	104	23	108	Good
	HTK000745	51	11-27	20	56-102	86	17	87	Fair
Kapoaiaia Stream	KPA000250	46	18-31	24	83-131	117	19	127	Very Good
	KPA000700	46	12-30	21	78-118	97	18	112	Good
	KPA000950	46	15-25	19	76-101	87	15	95	Fair
Kaupokonui River	KPK000250	47	20-36	27	124-140	130	23	135	Very Good
	KPK000500	50	20-33	26	98-138	118	21	128	Very Good
	KPK000660	54	14-32	24	71-128	104	20	109	Good
	KPK000880	54	13-31	18	66-110	91	11	100	Good
	KPK000990	46	11-26	19	69-103	91	12	90	Fair
Kurapete Stream	KRP000300	53	12-32	21	80-107	95	17	100	Good
	KRP000660	53	17-30	24	74-112	95	20	104	Good
Katikara Stream	KTK000150	45	11-38	24	112-151	135	20	145	Excellent
	KTK000248	43	16-31	25	80-118	102	21	94	Fair
Makara Stream	MAA000900	6	6-19	14	77-107	98	17	92	Fair
Mangorei Stream	MGE000970	39	18-33	26	84-113	102	15	93	Fair
Mangaehu River	MGH000950	54	10-26	19	77-108	92	18	104	Good
Manganui River	MGN000195	54	9-26	20	106-143	126	16	136	Very Good
	MGN000427	54	14-26	20	77-117	98	18	110	Good
Mangati Stream	MGT000488	53	9-29	16	56-91	77	15	84	Fair
	MGT000520	53	3-22	10	44-80	68	8	58	Very Poor
Makuri Stream	MKR000495	6	12-20	16	90-104	94	22	102	Good
Maketawa Stream	MKW000200	44	8-33	23	100-142	129	17	133	Very Good
	MKW000300	43	12-31	21	90-127	109	22	108	Good
Moumahaki Stream	MMK000050	5	13-19	17	73-94	85	11	78	Poor
Mangaoreti Stream	MNT000950	4	4-10	8	64-82	68	8	80	Fair
Mangaoraka Stream	MRK000420	53	11-30	25	75-105	90	24	93	Fair
Mangaroa Stream	MRO000210	3	10-15	10	68-84	74	10	78	Poor
Matau Stream	MTA000068	6	18-30	23	102-110	105	20	108	Good
Mangawhero Stream	MWH000490	54	13-30	20	63-102	83	21	101	Good
Pātea River	PAT000200	54	21-35	29	127-150	138	27	145	Excellent
	PAT000315	54	17-32	25	99-130	111	20	120	Very Good
	PAT000360	54	15-33	23	77-112	98	20	103	Good
Punehu Stream	PNH000200	54	18-32	26	104-139	125	19	124	Very Good
	PNH000900	54	10-26	21	70-114	91	17	115	Good
Stony River	STY000300	54	1-21	10	64-140	112	10	108	Good
	STY000400	52	2-18	10	67-150	108	5	128	Very Good
Timaru Stream	TMR000150	53	8-34	25	119-152	138	23	131	Very Good
	TMR000375	53	13-35	26	82-122	105	24	116	Good

River	Site	n	SOE Data 1995-2022				SOE Data 2022- 2023		
			Taxa No.		TRC MCI		Taxa No.	TRC MCI	TRC Grade
			Range	Median	Range	Median			
Tangahoe River	TNH000090	29	9-31	22	90-107	97	7	114	Good
	TNH000200	30	12-35	24	92-116	102	9	109	Good
	TNH000515	30	11-26	20	78-104	94	16	94	Fair
Uruti Stream	URU000198	6	14-22	21	88-96	91	15	77	Poor
Waiau Stream	WAI000110	46	15-30	21	79-101	90	12	97	Fair
Waiongana Stream	WGA000260	53	9-31	24	82-112	96	20	98	Fair
	WGA000450	53	12-29	21	72-104	89	18	88	Fair
Waingongoro River	WGG000115	54	19-40	30	122-145	133	26	140	Excellent
	WGG000150	54	18-39	26	119-139	129	15	127	Very Good
	WGG000500	54	15-29	22	93-125	104	14	107	Good
	WGG000665	54	14-30	20	77-111	96	16	106	Good
	WGG000895	54	13-25	21	73-106	94	21	98	Fair
	WGG000995	54	12-27	18	69-100	90	20	93	Fair
Waiau Stream (2)	WIU000700	4	5-12	12	68-77	70	-		Not surveyed
Waiwhakaiho	WKH000100	39	4-33	20	115-147	131	19	136	Very Good
	WKH000500	53	14-32	22	80-125	109	19	105	Good
	WKH000920	52	7-29	20	60-110	94	9	98	Fair
	WKH000950	51	8-30	20	70-111	88	11	91	Fair
Waiokura Stream	WKR000500	35	16-29	23	88-117	102	18	117	Good
	WKR000700	30	15-27	20	92-109	100	14	109	Good
Waimoku Stream	WMK000100	45	15-38	30	119-141	131	21	133	Very Good
	WMK000298	45	10-29	20	75-115	94	20	96	Fair
Waikaramarama Stream	WMR000100	4	18-27	21	95-101	100	13	98	Fair
Whenuakura River	WNR000450	14	11-32	18	71-99	87	-		Not surveyed
Waitara River	WTR000540	14	8-26	20	83-110	99	-		Not surveyed
	WTR000850	53	8-32	17	64-107	86	12	80	Fair

Appendix V

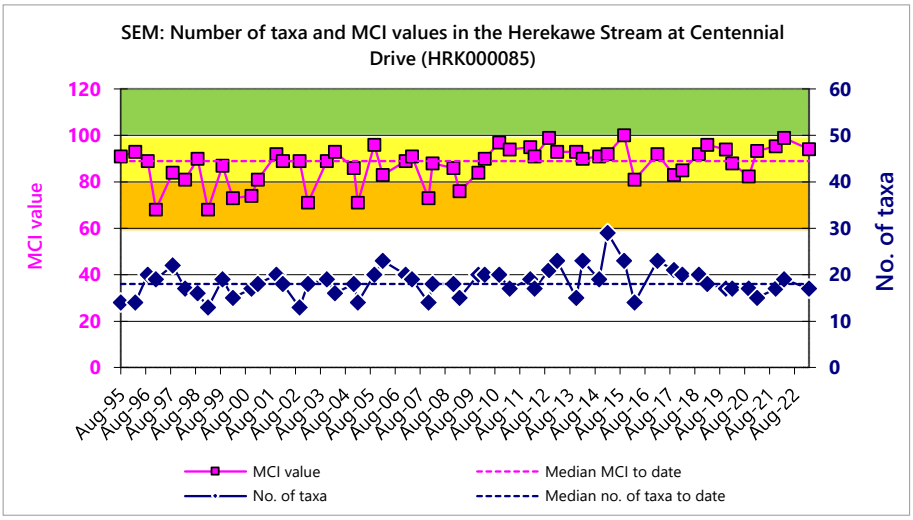
Recent macroinvertebrate community results and taxa and regionally-derived MCI results for the entire programme

Herekawe

Taxa List	Site Code / Sample Number	Taranaki MCI Score	HRK000085 / TRC2310364
Annelida (Worms)	Oligochaeta	1	R
Mollusca	*Potamopyrgus*	4	VA
Crustacea	*Paracalliope*	5	XA
Ephemeroptera (Mayflies)	*Austroclima*	7	C
	Coloburiscus	7	C
Plecoptera (Stoneflies)	*Megaleptoperla*	9	R
Coleoptera (Beetles)	Elmidae	6	A
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A
	Hydrobiosis	5	R
	Neurochorema	6	R
	Oxyethira	2	R
	Triplectides	5	R
Diptera (True Flies)	*Aphrophila*	5	R
	Tanytarsini	3	R
	Ephydridae	4	R
	Austrosimulium	3	R
	Tanyderidae	4	R
		Number of Taxa	17
		Taranaki MCI	94
		Taranaki SQMCI	4.9
		EPT (taxa)	7
		% EPT (taxa)	41

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

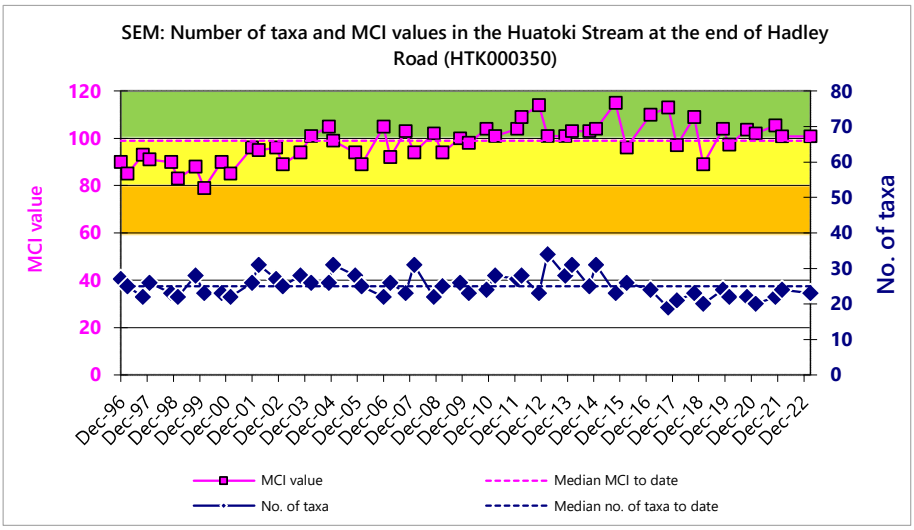


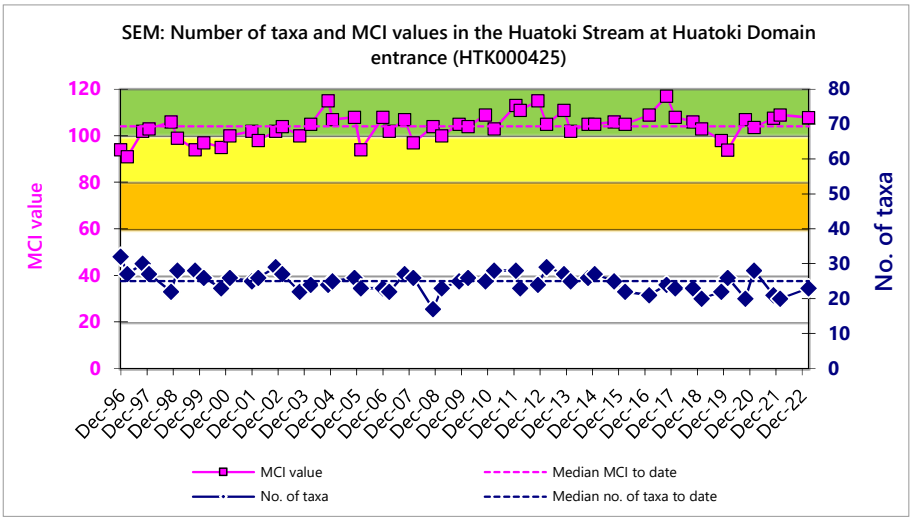
Huatoki

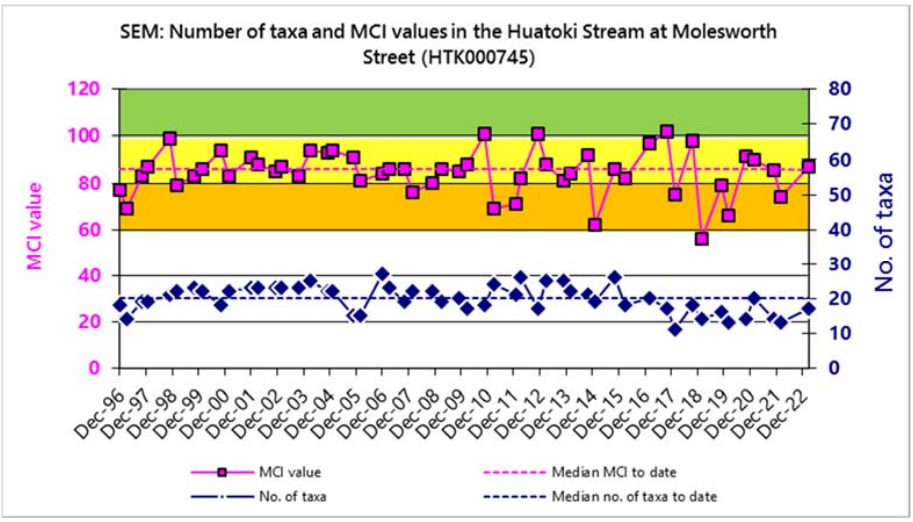
Taxa List	Site Code	Taranaki MCI Score	HTK000350	HTK000425	HTK000745
	Sample Number		TRC2310365	TRC2310366	TRC2310367
Nemertea	Nemertea	3	R	R	-
Annelida (Worms)	Oligochaeta	1	R	R	VA
	Lumbricidae	5	-	-	R
Hirudinea (Leeches)	Hirudinea	3	-	-	R
Mollusca	*Latia*	5	C	C	C
	Potamopyrgus	4	-	C	A
	Sphaeriidae	3	-	-	R
Crustacea	Ostracoda	1	-	-	R
	Paratya	3	-	-	C
	Paranephrops	5	R	-	-
Ephemeroptera (Mayflies)	*Austroclima*	7	C	A	-
	Coloburiscus	7	A	A	-
	Deleatidium	8	VA	VA	R
	Nesameletus	9	A	C	-
	Zephlebia group	7	-	-	R
Plecoptera (Stoneflies)	*Zelandobius*	5	-	R	-
Coleoptera (Beetles)	Elmidae	6	A	VA	A
	Ptilodactylidae	8	R	R	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	A	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	VA	A	R
	Costachorema	7	C	R	-
	Hydrobiosis	5	C	C	-
	Neurochorema	6	R	R	-
	Pycnocentria	7	-	R	-
	Pycnocentrodes	5	R	C	-
	Triplectides	5	-	-	R
Diptera (True Flies)	*Aphrophila*	5	C	C	-
	Eriopterini	5	-	R	-
	Maoridiamesa	3	C	-	-
	Orthocladiinae	2	C	-	-
	Tanytarsini	3	XA	R	-
	Muscidae	3	R	-	-
	Austrosimulium	3	R	R	R
	Tanyderidae	4	R	R	C
Acarina (Mites)	Acarina	5	-	-	R
		Number of Taxa	23	23	17
		Taranaki MCI	101	108	87
		Taranaki SQMCI	4.2	6.6	2.5
		EPT (taxa)	9	11	4
		% EPT (taxa)	39	48	24

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Huatoki Stream at the end of Hadley Road (HTK000350)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Huatoki Stream at Huatoki Domain entrance (HTK000425)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

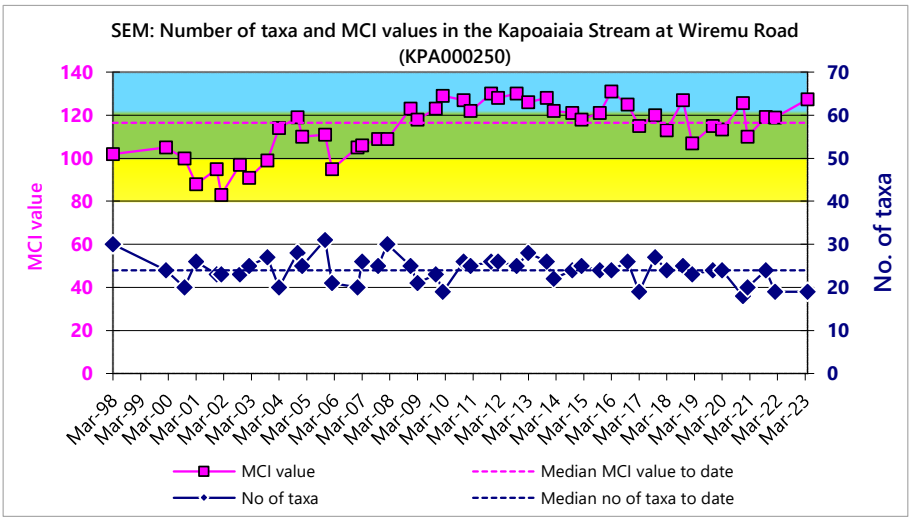

SEM: Number of taxa and MCI values in the Huatoki Stream at Molesworth Street (HTK000745)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

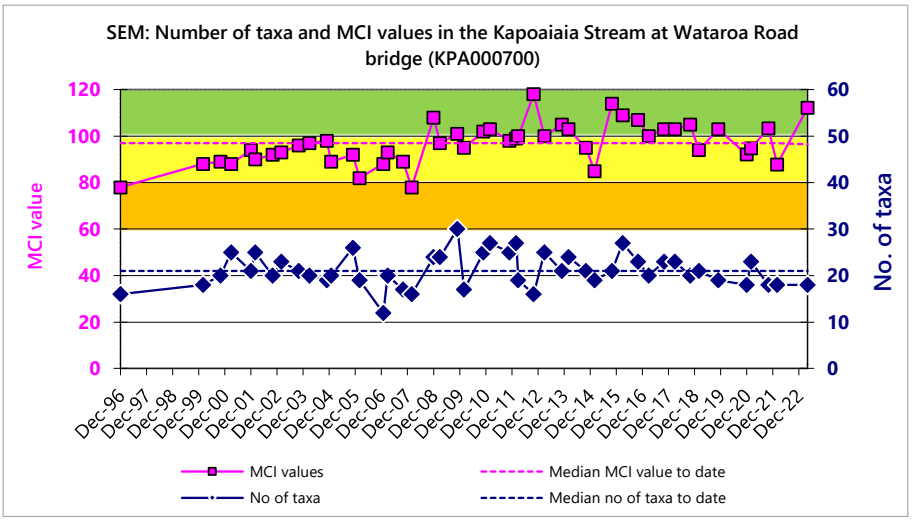
Kapoaiaia

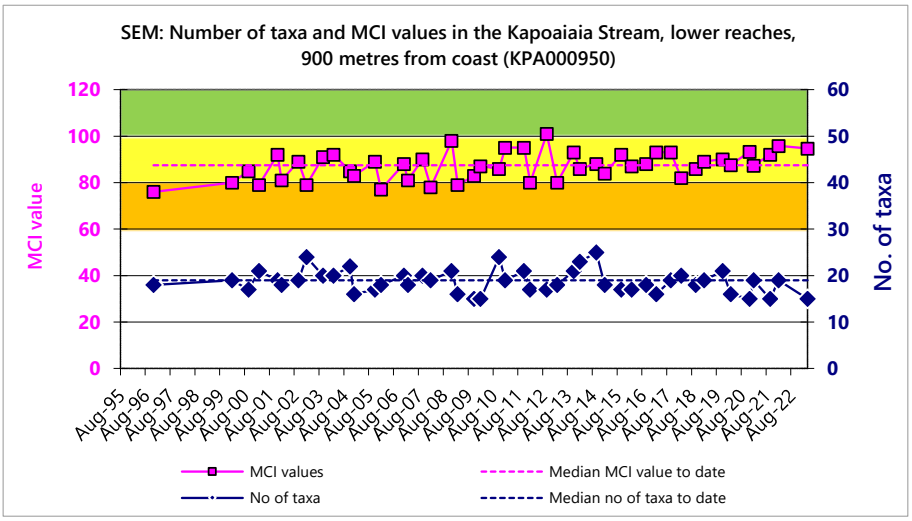
Taxa List	Site Code	Taranaki MCI Score	KPA000250	KPA000700	KPA000950
	Sample Number		TRC2310368	TRC2310369	TRC2310370
Annelida (Worms)	Oligochaeta	1	-	-	R
Mollusca	*Potamopyrgus*	4	-	-	C
Ephemeroptera (Mayflies)	*Austroclima*	7	R	R	R
	Coloburiscus	7	VA	C	-
	Deleatidium	8	XA	XA	A
	Nesameletus	9	VA	R	R
Plecoptera (Stoneflies)	*Stenoperla*	10	R	-	-
	Zelandoperla	8	C	R	-
Coleoptera (Beetles)	Elmidae	6	A	C	VA
	Hydraenidae	8	R	R	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	C	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A	A	A
	Costachorema	7	C	-	-
	Hydrobiosis	5	C	A	C
	Beraeoptera	8	A	R	-
	Olinga	9	R	-	-
	Oxyethira	2	-	-	R
	Pycnocentrodes	5	R	C	A
Diptera (True Flies)	*Aphrophila*	5	A	A	C
	Maoridiamesa	3	R	A	-
	Orthocladiinae	2	VA	VA	VA
	Tanytarsini	3	-	R	A
	Empididae	3	-	R	-
	Muscidae	3	-	A	-
	Austrosimulium	3	R	-	R
		Number of Taxa	19	18	15
		Taranaki MCI	127	112	95
		Taranaki SQMCI	7.1	6.6	4.4
		EPT (taxa)	12	9	6
		% EPT (taxa)	63	50	40

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Kapoaiaia Stream at Wiremu Road (KPA000250)
MCI value
No. of taxa
MCI value
No of taxa
Median MCI value to date
Median no of taxa to date


SEM: Number of taxa and MCI values in the Kapoaiaia Stream at Wataroa Road bridge (KPA000700)
MCI value
No. of taxa
MCI values
No of taxa
Median MCI value to date
Median no of taxa to date

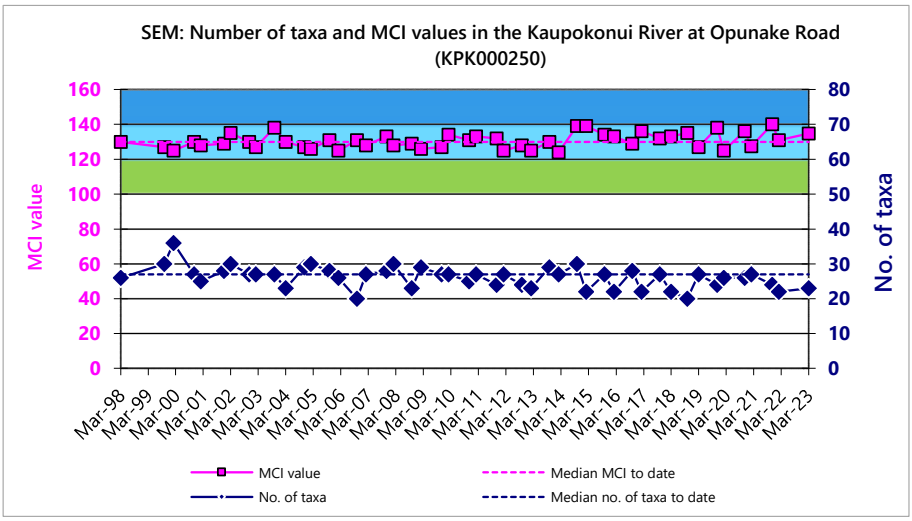

SEM: Number of taxa and MCI values in the Kapoaiaia Stream, lower reaches, 900 metres from coast (KPA000950)
MCI value
No. of taxa
MCI values
No of taxa
Median MCI value to date
Median no of taxa to date

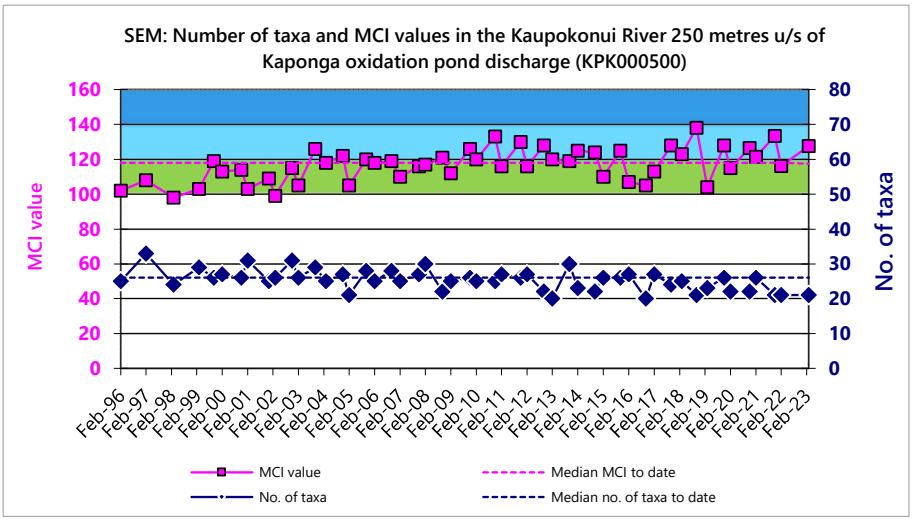
Kaūpokonui

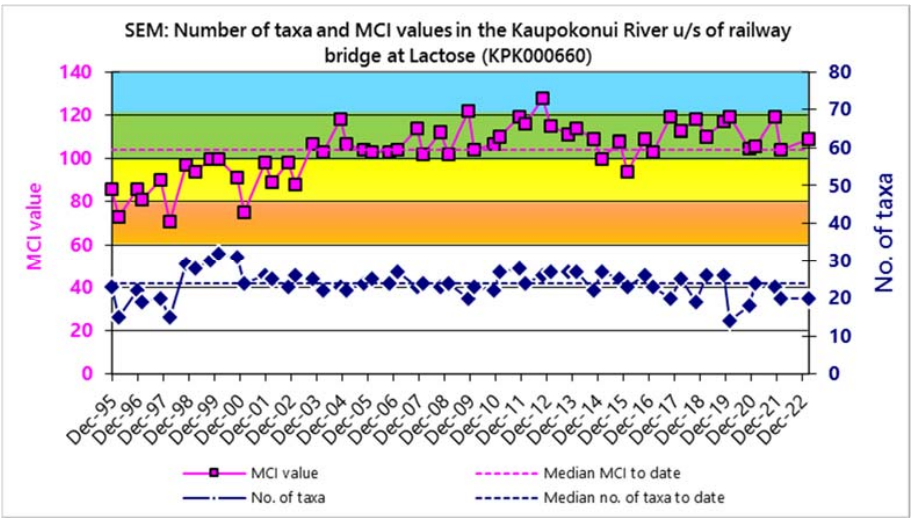
Taxa List	Site Code / Sample Number	Taranaki MCI Score	KPK000250 / TRC2310373	KPK000500 / TRC2310374	KPK000660 / TRC2310375	KPK000880 / TRC2310376	KPK000990 / TRC2310377
Annelida (Worms)	Oligochaeta	1	-	-	-	R	R
	Lumbricidae	5	-	-	-	R	-
Mollusca	*Potamopyrgus*	4	-	-	XA	-	R
Ephemeroptera (Mayflies)	*Austroclima*	7	C	C	C	C	C
	Coloburiscus	7	A	VA	A	-	-
	Deleatidium	8	VA	XA	-	VA	VA
	Ichthybotus	8	R	-	-	-	-
	Nesameletus	9	A	VA	A	-	-
Plecoptera (Stoneflies)	*Austroperla*	9	R	-	-	-	-
	Megaleptoperla	9	C	R	-	-	-
	Stenoperla	10	R	-	-	-	-
	Zelandoperla	8	C	R	-	-	-
Coleoptera (Beetles)	Elmidae	6	A	A	A	VA	VA
	Hydraenidae	8	R	-	-	-	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	A	A	A	R	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A	VA	VA	VA	XA
	Costachorema	7	R	A	R	R	-
	Hydrobiosis	5	C	C	C	C	A
	Neurochorema	6	-	C	-	-	-
	Polyplectropus	6	-	-	R	-	-
	Psilochorema	6	C	-	-	-	-
	Beraeoptera	8	XA	XA	VA	-	-
	Helicopsyche	10	-	R	-	-	-
	Olinga	9	VA	C	C	-	-
	Pycnocentrodes	5	R	VA	R	-	-
Diptera (True Flies)	*Aphrophila*	5	A	A	C	-	-
	Eriopterini	5	R	R	R	-	-
	Maoridiamesa	3	-	C	R	C	-
	Orthocladiinae	2	R	-	R	A	VA
	Polypedilum	3	R	-	-	-	-
	Tanytarsini	3	-	R	-	-	C
	Muscidae	3	-	R	R	-	R
	Austrosimulium	3	-	-	R	-	-
	Tanyderidae	4	-	-	R	-	R
	Number of Taxa		23	21	20	11	12
	Taranaki MCI		135	128	109	100	90
	Taranaki SQMCI		7.8	7.4	4.9	5.7	4.5
	EPT (taxa)		16	14	10	5	4
	% EPT (taxa)		70	67	50	45	33

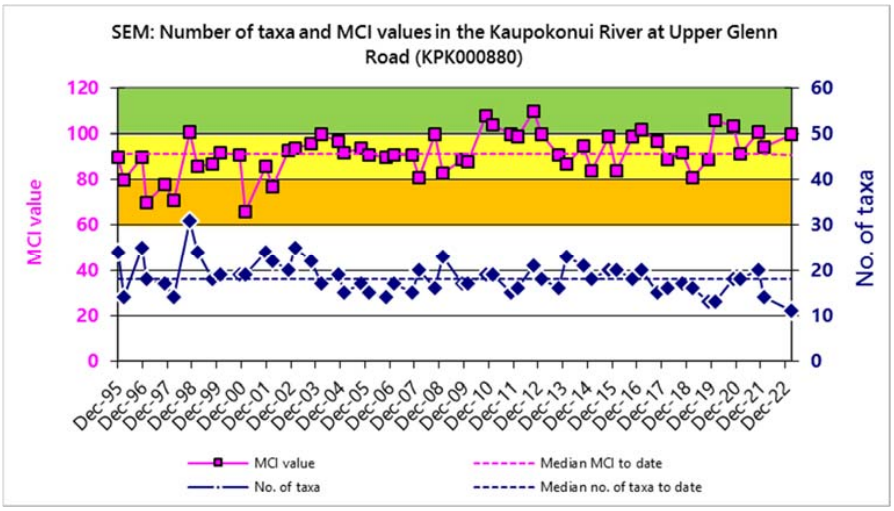
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

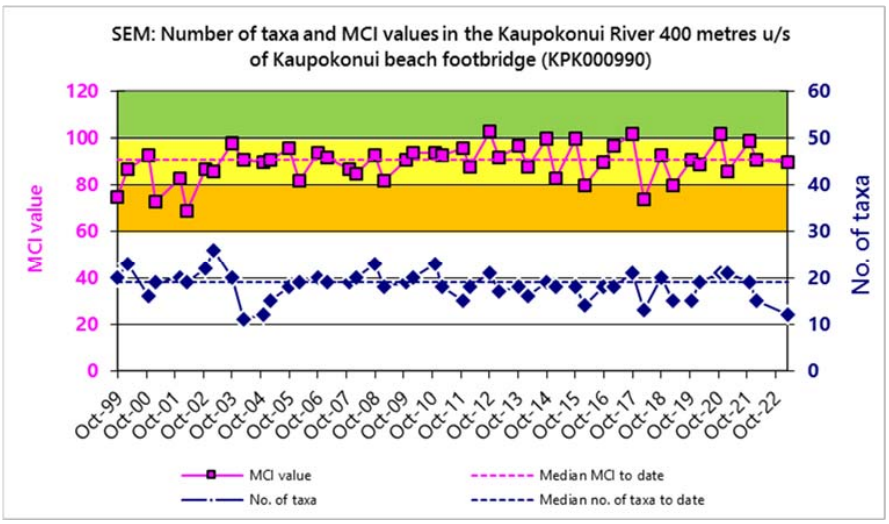
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Kaupokonui River at Opunake Road (KPK000250)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Kaupokonui River 250 metres u/s of Kaponga oxidation pond discharge (KPK000500)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Kaupokonui River u/s of railway bridge at Lactose (KPK000660)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Kaupokonui River at Upper Glenn Road (KPK000880)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

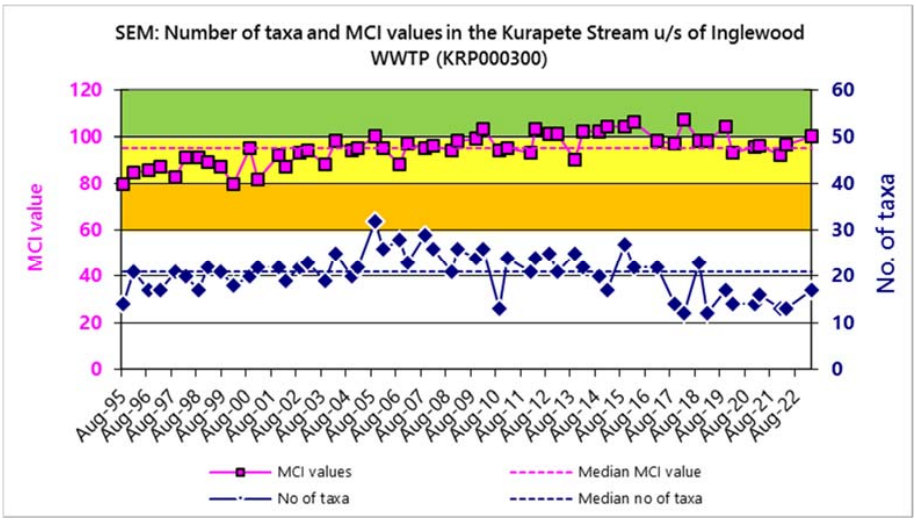

SEM: Number of taxa and MCI values in the Kaupokonui River 400 metres u/s of Kaupokonui beach footbridge (KPK000990)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

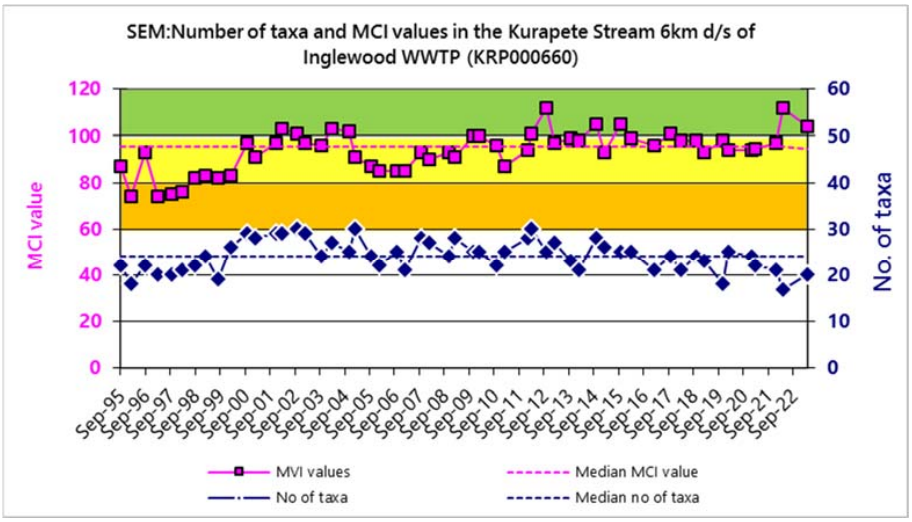
Kurapete

Taxa List	Site Code	Taranaki MCI Score	KRP000300	KRP000660
	Sample Number		TRC2310378	TRC2310379
Annelida (Worms)	Oligochaeta	1	C	A
Mollusca	*Latia*	5	R	-
	Potamopyrgus	4	A	A
Ephemeroptera (Mayflies)	*Austroclima*	7	A	VA
	Coloburiscus	7	C	A
	Deleatidium	8	-	R
	Zephlebia group	7	A	R
Plecoptera (Stoneflies)	*Zelandobius*	5	-	C
Coleoptera (Beetles)	Elmidae	6	C	VA
	Ptilodactylidae	8	R	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	A
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A	A
	Hydrobiosis	5	R	C
	Neurochorema	6	-	C
	Pycnocentria	7	R	-
	Pycnocentrodes	5	-	VA
Diptera (True Flies)	*Aphrophila*	5	-	R
	Eriopterini	5	-	R
	Orthocladiinae	2	R	R
	Tanypodinae	5	R	R
	Tanytarsini	3	R	-
	Austrosimulium	3	A	C
	Tanyderidae	4	R	R
		Number of Taxa	17	20
		Taranaki MCI	100	104
		Taranaki SQMCI	5	5.6
		EPT (taxa)	6	9
		% EPT (taxa)	35	45

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Kurapete Stream u/s of Inglewood WWTP (KRP000300)
MCI value
No. of taxa
MCI values
Median MCI value
No of taxa
Median no of taxa

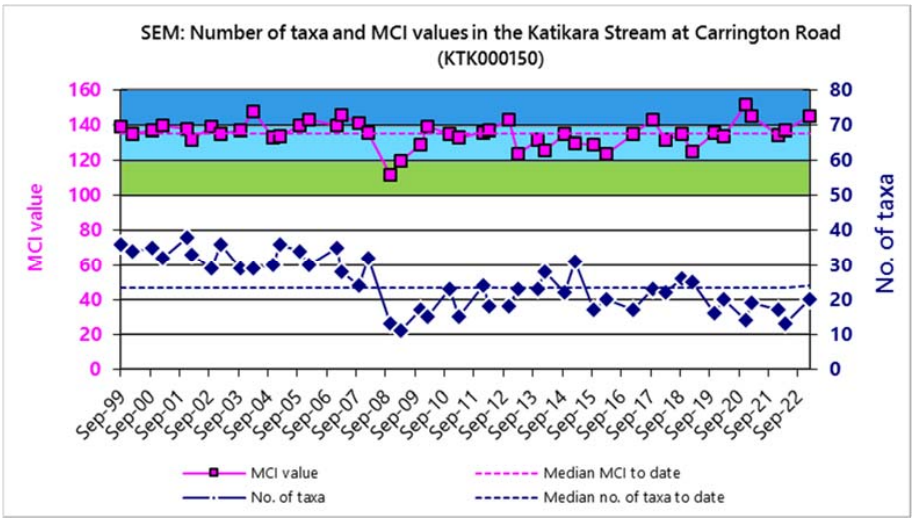

SEM:Number of taxa and MCI values in the Kurapete Stream 6km d/s of Inglewood WWTP (KRP000660)
MCI value
No. of taxa
MVI values
Median MCI value
No of taxa
Median no of taxa

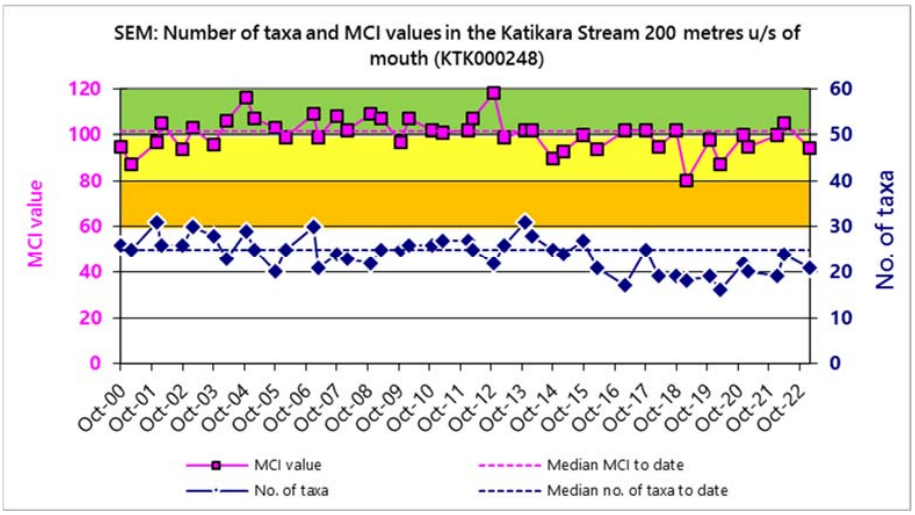
Katikara

Taxa List	Site Code	Taranaki MCI Score	KTK000150	KTK000248
	Sample Number		TRC2310371	TRC2310372
Nemertea	Nemertea	3	-	R
Annelida (Worms)	Oligochaeta	1	-	R
Mollusca	*Zemelanopsis*	3	-	R
	Potamopyrgus	4	-	C
Ephemeroptera (Mayflies)	*Ameletopsis*	10	C	-
	Austroclima	7	R	R
	Coloburiscus	7	A	R
	Deleatidium	8	A	A
	Nesameletus	9	A	-
Plecoptera (Stoneflies)	*Austroperla*	9	C	-
	Stenoperla	10	R	-
	Taraperla	10	R	-
	Zelandoperla	8	R	-
Coleoptera (Beetles)	Elmidae	6	-	VA
	Hydraenidae	8	C	-
	Ptilodactylidae	8	-	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	-	A
	Costachorema	7	R	-
	Hydrobiosis	5	C	A
	Hydrobiosella	9	R	-
	Neurochorema	6	-	R
	Hydropsyche (Orthopsyche)	9	C	-
	Polyplectropus	6	R	-
	Psilochorema	6	R	-
	Pycnocentrodes	5	-	C
Diptera (True Flies)	*Aphrophila*	5	-	C
	Eriopterini	5	R	R
	Maoridiamesa	3	-	A
	Orthocladiinae	2	R	A
	Polypedilum	3	C	-
	Tanytarsini	3	-	VA
	Austrosimulium	3	-	R
	Tanyderidae	4	-	R
		Number of Taxa	20	21
		Taranaki MCI	145	94
		Taranaki SQMCI	7.7	4.5
		EPT (taxa)	15	7
		% EPT (taxa)	75	33

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Katikara Stream at Carrington Road (KTK000150)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

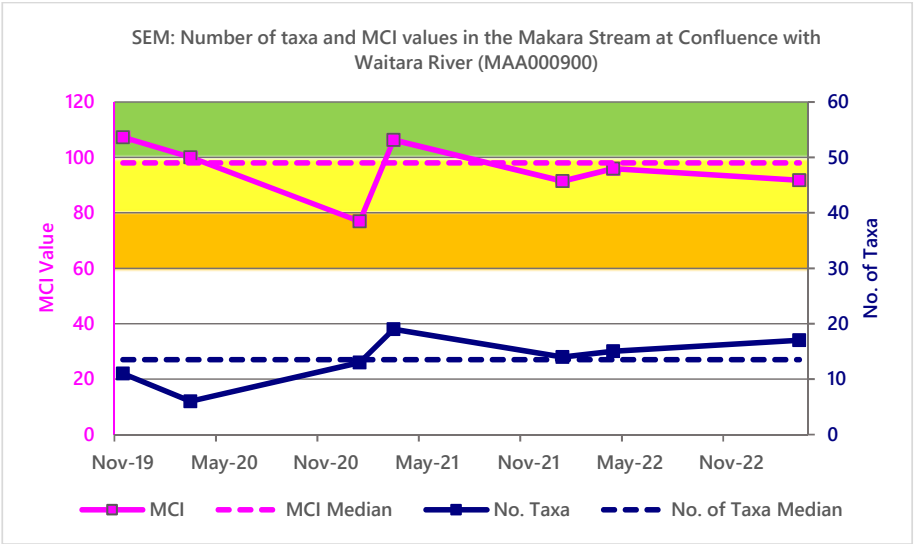

SEM: Number of taxa and MCI values in the Katikara Stream 200 metres u/s of mouth (KTK000248)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

Makara

Taxa List	Site Code	Taranaki MCI Score	MAA000900
	Sample Number		TRC2310380
Annelida (Worms)	Oligochaeta	1	R
Mollusca	*Potamopyrgus*	4	C
Ephemeroptera (Mayflies)	*Deleatidium*	8	VA
	Zephlebia group	7	R
Plecoptera (Stoneflies)	*Zelandobius*	5	R
Coleoptera (Beetles)	Elmidae	6	C
Trichoptera (Caddisflies)	*Costachorema*	7	C
	Hydrobiosis	5	A
	Neurochorema	6	R
	Psilochorema	6	R
	Oxyethira	2	R
	Triplectides	5	R
Diptera (True Flies)	Eriopterini	5	C
	Orthocladiinae	2	R
	Polypedilum	3	A
	Tanytarsini	3	C
	Austrosimulium	3	A
		Number of Taxa	17
		Taranaki MCI	92
		Taranaki SQMCI	6.1
		EPT (taxa)	8
		% EPT (taxa)	47

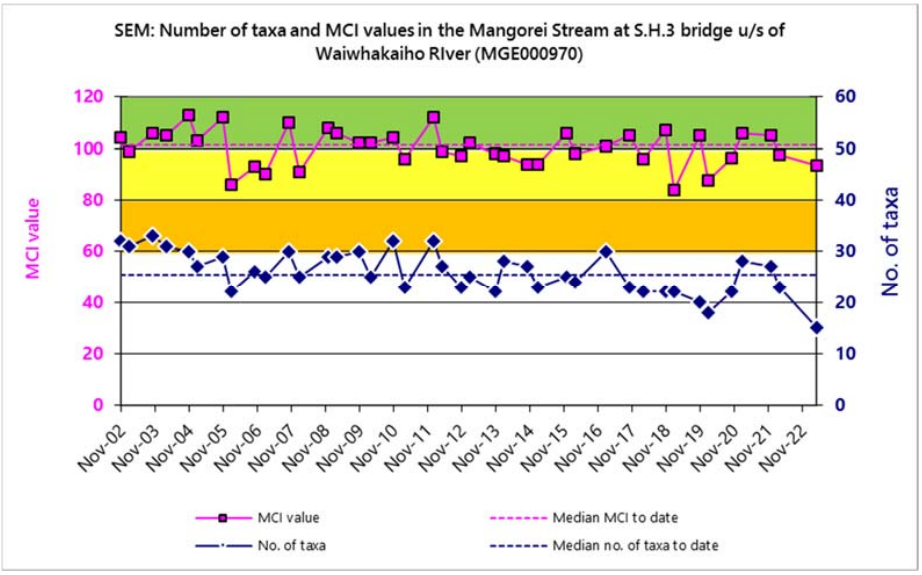
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant



Mangorei

Taxa List	Site Code	Taranaki MCI Score	MGE000970
	Sample Number		TRC2310523
Annelida (Worms)	Lumbricidae	5	R
Mollusca	*Potamopyrgus*	4	C
Ephemeroptera (Mayflies)	*Coloburiscus*	7	R
	Deleatidium	8	R
Coleoptera (Beetles)	Elmidae	6	A
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	VA
	Hydrobiosis	5	R
	Neurochorema	6	R
	Oxyethira	2	R
	Pycnocentrodes	5	R
Diptera (True Flies)	Orthocladiinae	2	C
	Tanytarsini	3	A
	Empididae	3	R
	Austrosimulium	3	R
		Number of Taxa	15
		Taranaki MCI	93
		Taranaki SQMCI	4.2
		EPT (taxa)	6
		% EPT (taxa)	40
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa	
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant			

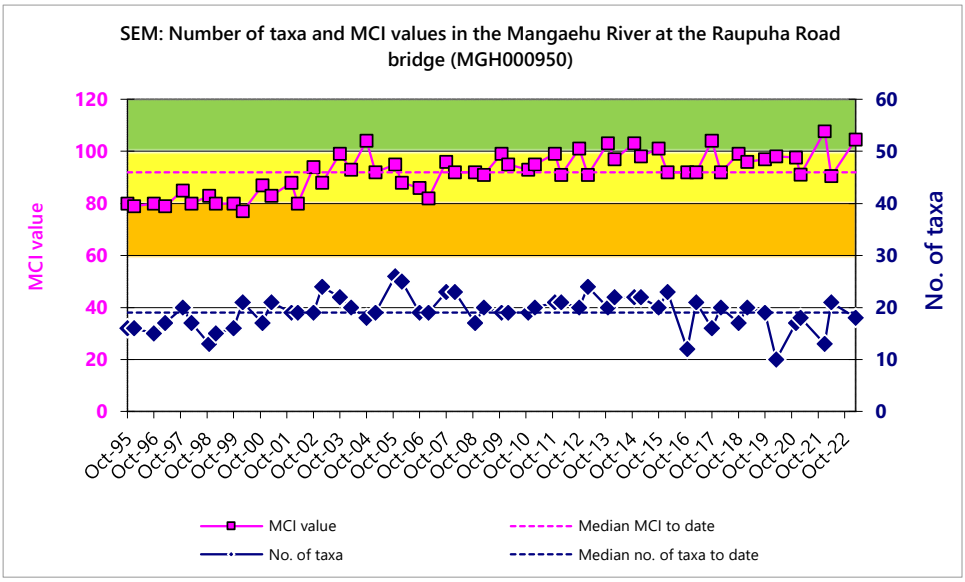


Mangaehu

Taxa List	Site Code	Taranaki MCI Score	MGH000950
	Sample Number		TRC2310999
Mollusca	*Potamopyrgus*	4	A
Ephemeroptera (Mayflies)	*Austroclima*	7	R
	Deleatidium	8	A
	Zephlebia group	7	R
Coleoptera (Beetles)	Elmidae	6	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	C
	Costachorema	7	R
	Hydrobiosis	5	A
	Neurochorema	6	R
	Hydropsyche (Orthopsyche)	9	R
	Pycnocentria	7	R
	Pycnocentrodes	5	R
Diptera (True Flies)	*Aphrophila*	5	A
	Maoridiamesa	3	R
	Orthocladiinae	2	A
	Polypedilum	3	C
	Tanytarsini	3	C
	Muscidae	3	R
		Number of Taxa	18
		Taranaki MCI	104
		Taranaki SQMCI	4.7
		EPT (taxa)	10
		% EPT (taxa)	56

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

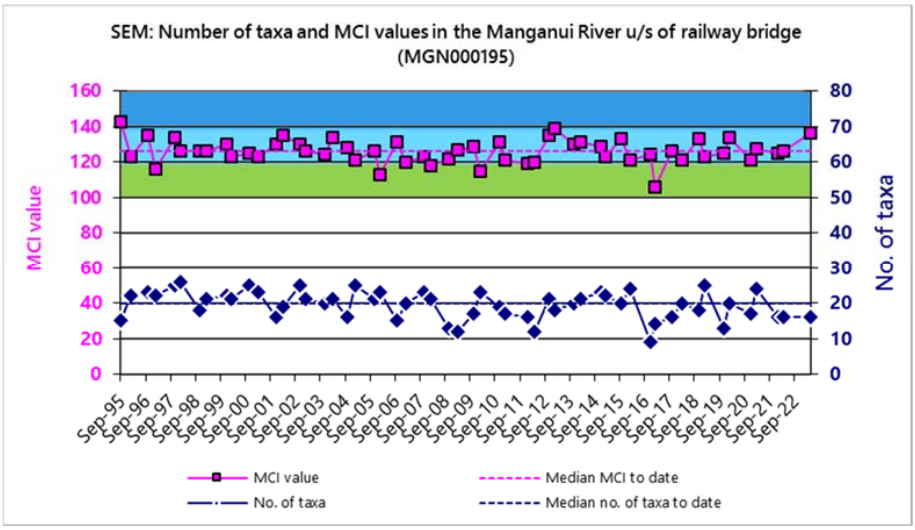


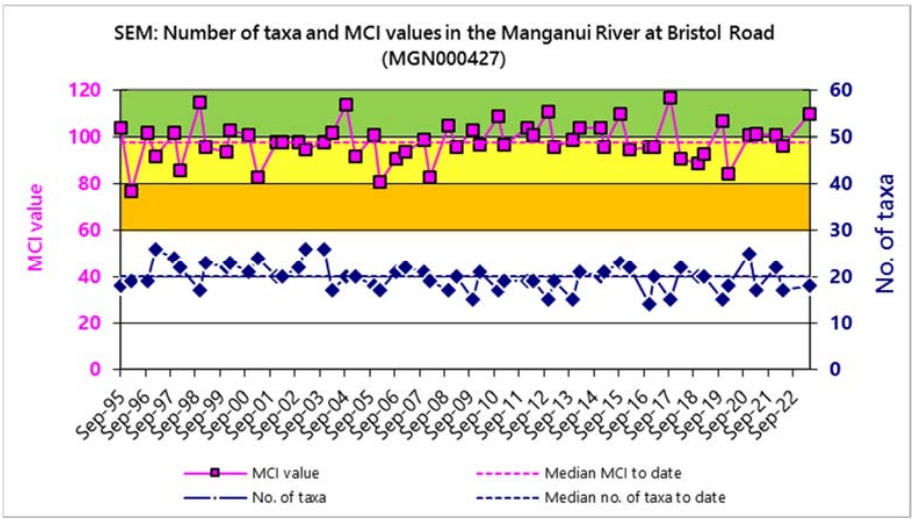
Manganui

Taxa List	Site Code	Taranaki MCI Score	MGN000195	MGN000427
	Sample Number		TRC2310993	TRC2310994
Annelida (Worms)	Oligochaeta	1	-	R
Mollusca	*Potamopyrgus*	4	-	A
Ephemeroptera (Mayflies)	*Coloburiscus*	7	A	A
	Deleatidium	8	VA	VA
	Nesameletus	9	C	-
	Zephlebia group	7	-	R
Plecoptera (Stoneflies)	*Taraperla*	10	R	-
	Zelandoperla	8	A	-
Coleoptera (Beetles)	Elmidae	6	R	R
	Hydraenidae	8	R	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	R	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	C	A
	Costachorema	7	R	C
	Hydrobiosis	5	R	A
	Neurochorema	6	-	R
	Beraeoptera	8	A	R
	Confluens	5	-	R
	Olinga	9	C	R
	Pycnocentrodes	5	-	R
Diptera (True Flies)	*Aphrophila*	5	A	C
	Eriopterini	5	R	-
	Maoridiamesa	3	-	R
	Orthocladiinae	2	-	R
	Austrosimulium	3	R	-
		Number of Taxa	16	18
		Taranaki MCI	136	110
		Taranaki SQMCI	7.5	6.6
		EPT (taxa)	10	11
		% EPT (taxa)	63	61

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Manganui River u/s of railway bridge (MGN000195)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

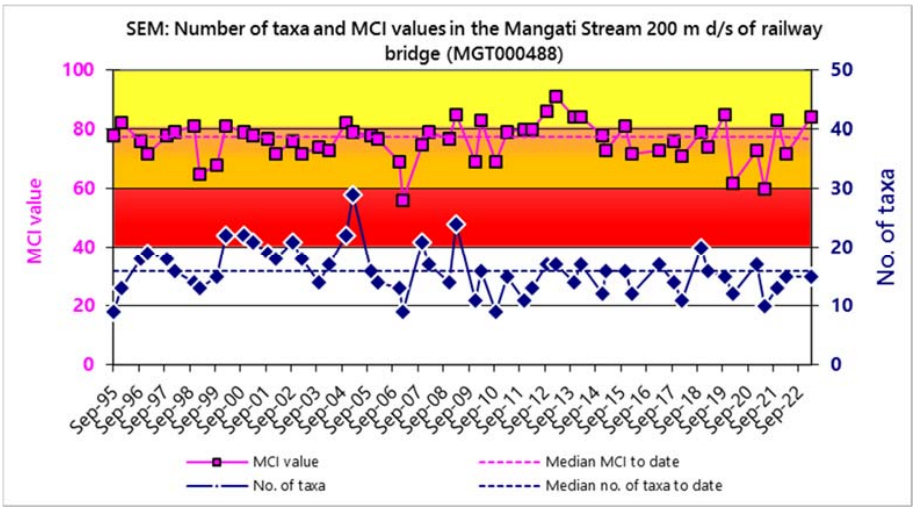

SEM: Number of taxa and MCI values in the Manganui River at Bristol Road (MGN000427)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

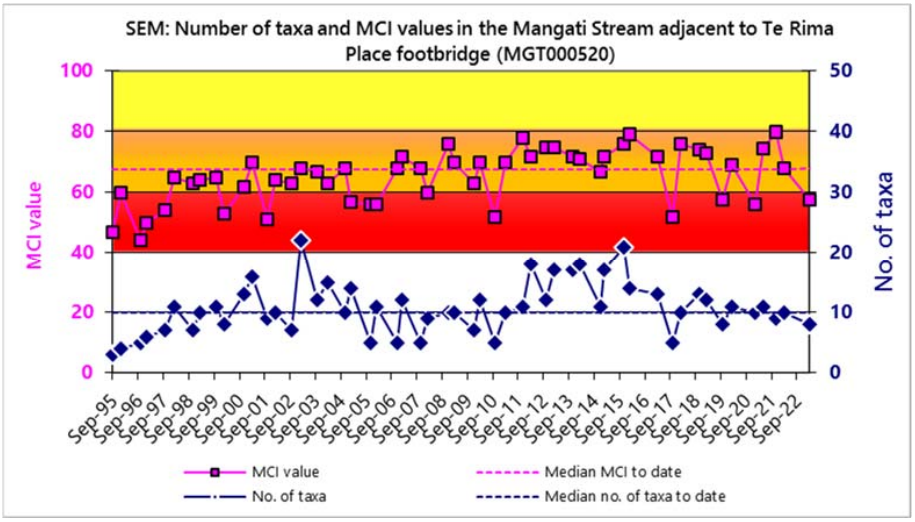
Mangatī

Taxa List	Site Code	Taranaki MCI Score	MGT000488	MGT000520
	Sample Number		TRC2311141	TRC2311147
Heterotroph	No dense heterotrophic growths		P	P
Nemertea	Nemertea	3	R	R
Annelida (Worms)	Oligochaeta	1	A	R
Mollusca	*Physella*	3	R	-
	Potamopyrgus	4	VA	XA
Crustacea	*Paracalliope*	5	VA	-
Ephemeroptera (Mayflies)	*Austroclima*	7	C	-
	Zephlebia group	7	R	-
Trichoptera (Caddisflies)	*Hydrobiosis*	5	R	R
	Oxyethira	2	-	C
	Triplectides	5	R	-
Diptera (True Flies)	Orthocladiinae	2	C	A
	Polypedilum	3	-	R
	Tanypodinae	5	R	-
	Paradixa	4	R	-
	Austrosimulium	3	A	R
	Tanyderidae	4	R	-
Acarina (Mites)	Acarina	5	C	-
		Number of Taxa	15	8
		Taranaki MCI	84	58
		Taranaki SQMCI	4.1	3.9
		EPT (taxa)	4	1
		% EPT (taxa)	27	13

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Mangati Stream 200 m d/s of railway bridge (MGT000488)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

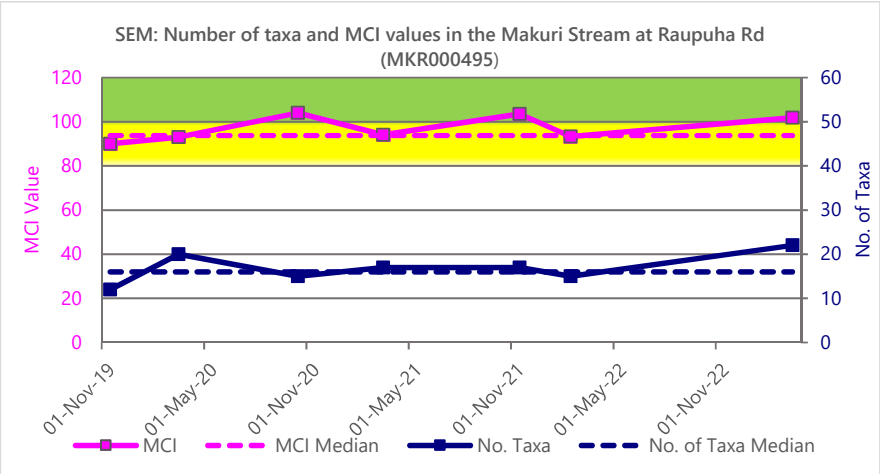

SEM: Number of taxa and MCI values in the Mangati Stream adjacent to Te Rima Place footbridge (MGT000520)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

Makuri

Taxa List	Site Code	Taranaki MCI Score	MKR000495
	Sample Number		TRC2310583
Annelida (Worms)	Oligochaeta	1	C
	Lumbricidae	5	R
Mollusca	*Potamopyrgus*	4	A
Crustacea	*Paracalliope*	5	R
Ephemeroptera (Mayflies)	*Austroclima*	7	A
	Coloburiscus	7	C
	Deleatidium	8	VA
	Zephlebia group	7	C
Coleoptera (Beetles)	Elmidae	6	A
	Hydraenidae	8	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A
	Costachorema	7	R
	Hydrobiosis	5	C
	Pycnocentria	7	R
	Pycnocentrodes	5	C
Diptera (True Flies)	*Aphrophila*	5	C
	Maoridiamesa	3	R
	Orthocladiinae	2	C
	Polypedilum	3	R
	Tanytarsini	3	R
	Austrosimulium	3	R
		Number of Taxa	22
		Taranaki MCI	102
		Taranaki SQMCI	6.4
		EPT (taxa)	9
		% EPT (taxa)	41

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

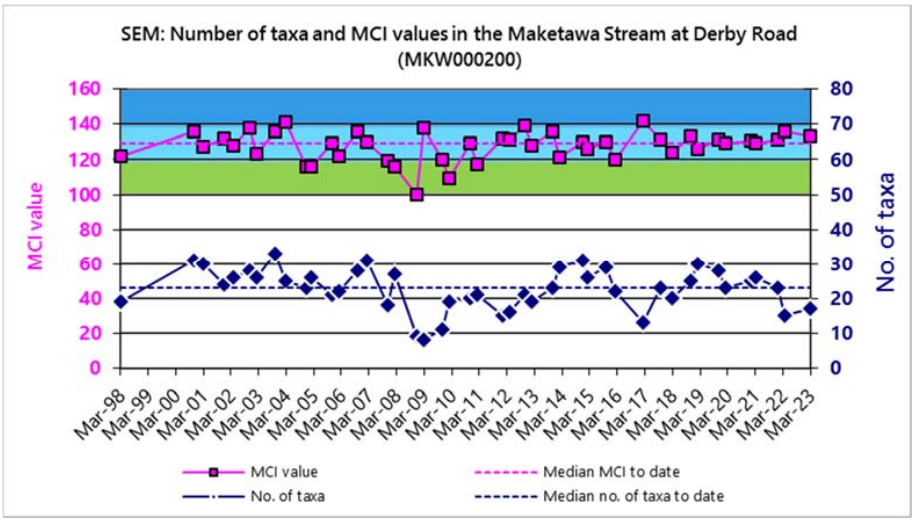


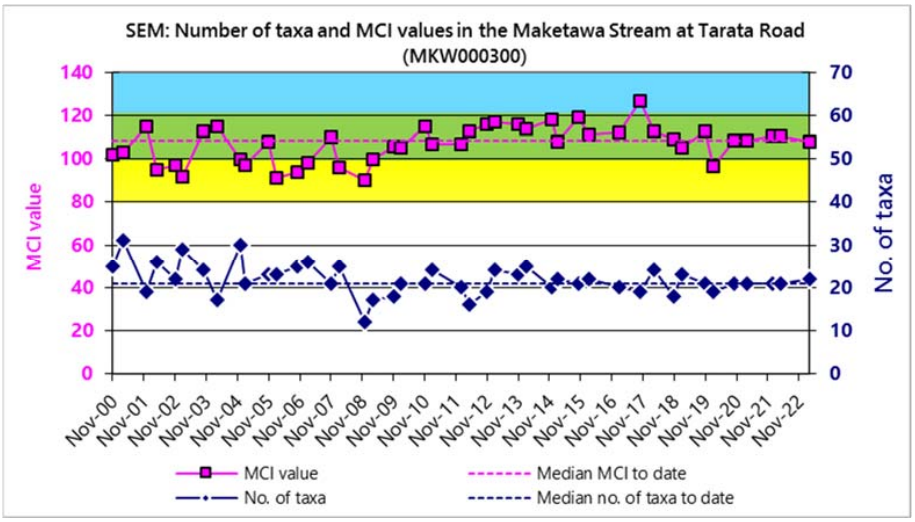
Maketawa

Taxa List	Site Code	Taranaki MCI Score	MKW000200	MKW000300
	Sample Number		TRC2310989	TRC2310990
Mollusca	*Potamopyrgus*	4	-	R
Ephemeroptera (Mayflies)	*Austroclima*	7	-	R
	Coloburiscus	7	R	C
	Deleatidium	8	VA	A
	Nesameletus	9	A	C
Plecoptera (Stoneflies)	*Austroperla*	9	R	R
	Megaleptoperla	9	R	-
	Zelandoperla	8	A	-
Hemiptera (Bugs)	*Saldidae*	5	-	R
Coleoptera (Beetles)	Elmidae	6	A	C
Megaloptera (Dobsonflies)	*Archichauliodes*	7	-	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A	VA
	Costachorema	7	C	C
	Hydrobiosis	5	R	C
	Neurochorema	6	R	R
	Psilochorema	6	R	-
	Beraeoptera	8	R	-
	Olinga	9	R	R
	Oxyethira	2	-	R
	Pycnocentrodes	5	-	R
Diptera (True Flies)	*Aphrophila*	5	A	A
	Eriopterini	5	R	-
	Maoridiamesa	3	-	A
	Orthocladiinae	2	C	A
	Tanytarsini	3	-	VA
	Muscidae	3	-	R
	Austrosimulium	3	-	R
		Number of Taxa	17	22
		Taranaki MCI	133	108
		Taranaki SQMCI	7.1	4.1
		EPT (taxa)	13	11
		% EPT (taxa)	76	50

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

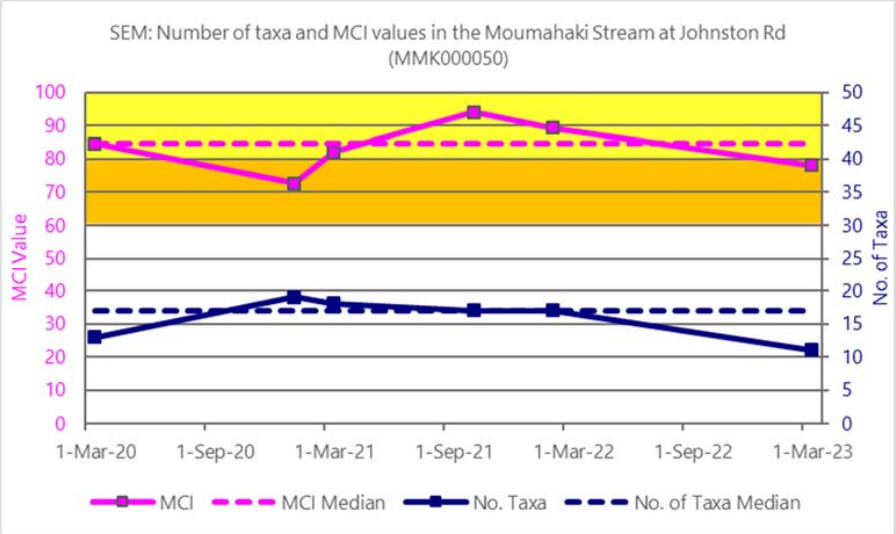

SEM: Number of taxa and MCI values in the Maketawa Stream at Derby Road
(MKW000200)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Maketawa Stream at Tarata Road
(MKW000300)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

Moumahaki

Taxa List	Site Code	Taranaki MCI Score	MMK000050
	Sample Number		TRC2310586
Annelida (Worms)	Oligochaeta	1	R
Mollusca	*Potamopyrgus*	4	R
Crustacea	Ostracoda	1	R
	Paracalliope	5	VA
	Phreatogammarus	5	C
Coleoptera (Beetles)	Elmidae	6	R
Trichoptera (Caddisflies)	*Hydrobiosis*	5	R
	Triplectides	5	R
Diptera (True Flies)	*Paralimnophila*	6	R
	Orthocladiinae	2	C
	Polypedilum	3	C
		Number of Taxa	11
		Taranaki MCI	78
		Taranaki SQMCI	4.7
		EPT (taxa)	2
		% EPT (taxa)	18
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa	

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

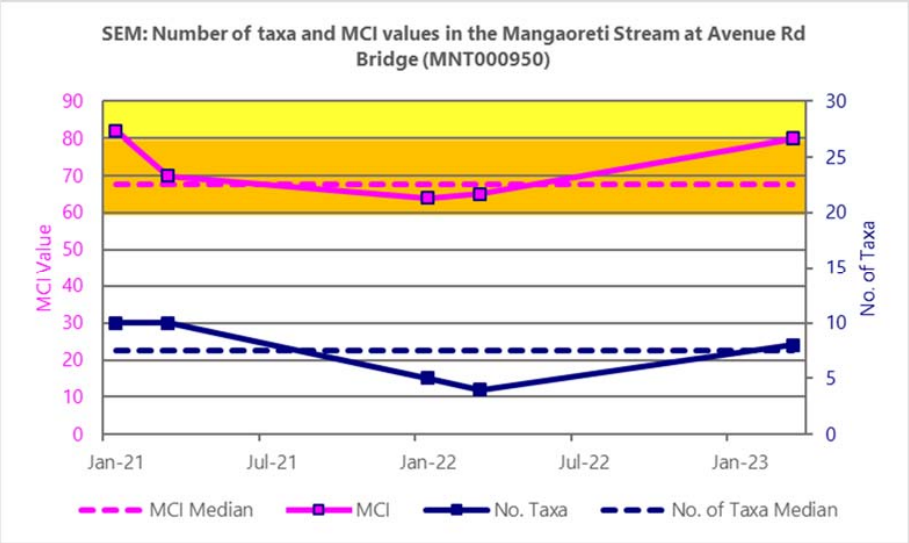


Mangaoreti

Taxa List	Site Code	Taranaki MCI Score	MNT000950
	Sample Number		TRC2310382
Nemertea	Nemertea	3	R
Mollusca	*Zemelanopsis*	3	R
	Potamopyrgus	4	R
Crustacea	*Phreatogammarus*	5	C
	Paratya	3	A
Diptera (True Flies)	Eriopterini	5	R
	Harrisius	6	R
	Austrosimulium	3	R
		Number of Taxa	8
		Taranaki MCI	80
		Taranaki SQMCI	3.5
		EPT (taxa)	0
		% EPT (taxa)	0

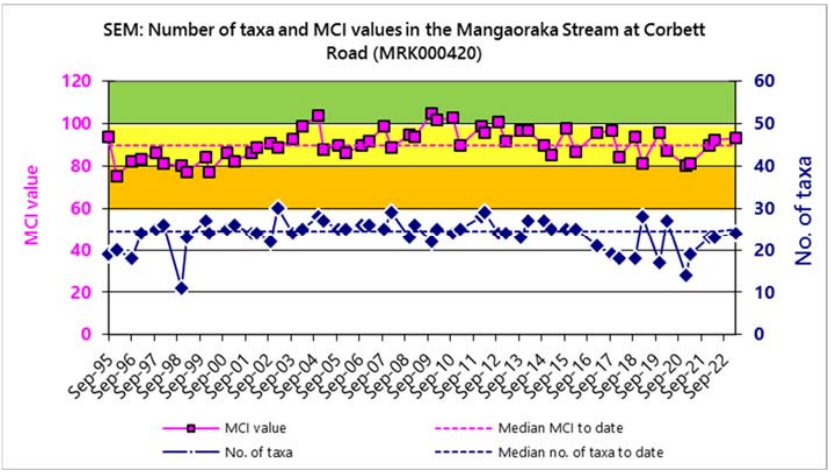
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant



Mangaoraka

Taxa List	Site Code / Sample Number	Taranaki MCI Score	MRK000420 / TRC2310381
Platyhelminthes (Flatworms)	*Cura*	3	R
Annelida (Worms)	Oligochaeta	1	R
	Lumbricidae	5	R
Mollusca	*Latia*	5	C
	Potamopyrgus	4	A
Ephemeroptera (Mayflies)	*Austroclima*	7	VA
	Coloburiscus	7	C
	Deleatidium	8	C
	Zephlebia group	7	R
Coleoptera (Beetles)	Elmidae	6	VA
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	VA
	Hydrobiosis	5	C
	Neurochorema	6	R
	Oxyethira	2	R
	Pycnocentria	7	C
	Pycnocentrodes	5	C
Diptera (True Flies)	*Aphrophila*	5	C
	Maoridiamesa	3	R
	Orthocladiinae	2	A
	Tanytarsini	3	VA
	Muscidae	3	R
	Austrosimulium	3	C
	Tanyderidae	4	R
		Number of Taxa	24
		Taranaki MCI	93
		Taranaki SQMCI	4.9
		EPT (taxa)	9
		% EPT (taxa)	38
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa	
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant			

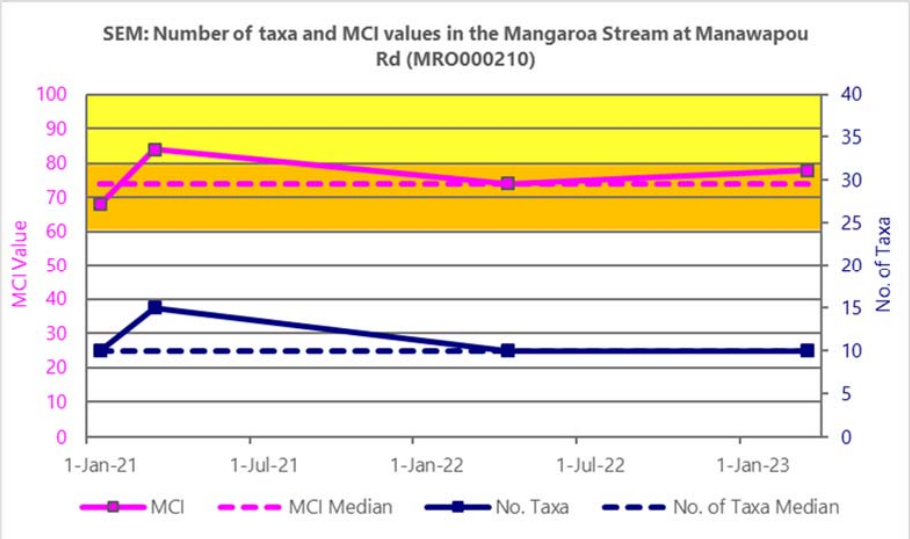


Mangaroa

Taxa List	Site Code	Taranaki MCI Score	MRO000210
	Sample Number		TRC2310383
Mollusca	*Potamopyrgus*	4	VA
Crustacea	*Paracalliope*	5	XA
	Phreatogammarus	5	A
	Talitridae	5	C
Trichoptera (Caddisflies)	*Oxyethira*	2	R
Lepidoptera (Moths)	*Hygraula*	4	R
Diptera (True Flies)	*Polypedilum*	3	R
	Empididae	3	R
	Austrosimulium	3	A
Acarina (Mites)	Acarina	5	R
		Number of Taxa	10
		Taranaki MCI	78
		Taranaki SQMCI	4.8
		EPT (taxa)	0
		% EPT (taxa)	0

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

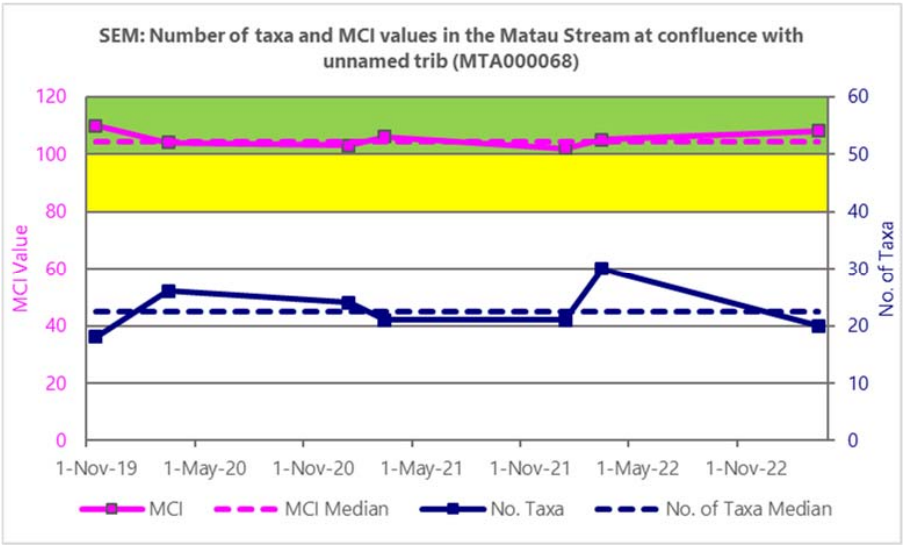


Matau

Taxa List	Site Code	Taranaki MCI Score	MTA000068
	Sample Number		TRC2310386
Mollusca	*Potamopyrgus*	4	R
Ephemeroptera (Mayflies)	*Austroclima*	7	A
	Coloburiscus	7	R
	Deleatidium	8	C
	Nesameletus	9	R
	Rallidens	9	C
	Zephlebia group	7	C
Coleoptera (Beetles)	Elmidae	6	A
	Ptilodactylidae	8	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	C
	Hydrobiosis	5	C
Diptera (True Flies)	*Aphrophila*	5	A
	Eriopterini	5	R
	Maoridiamesa	3	R
	Orthocladiinae	2	VA
	Polypedilum	3	R
	Tanytarsini	3	C
	Empididae	3	R
	Austrosimulium	3	R
		Number of Taxa	20
		Taranaki MCI	108
		Taranaki SQMCI	4
		EPT (taxa)	8
		% EPT (taxa)	40

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

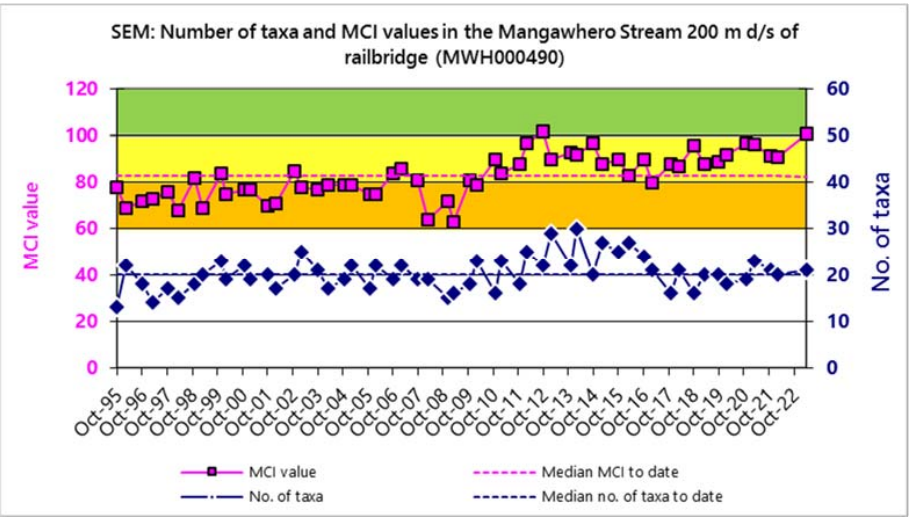


Mangawhero

Taxa List	Site Code	Taranaki MCI Score	MWH000490
	Sample Number		TRC2310385
Annelida (Worms)	Oligochaeta	1	A
Mollusca	*Potamopyrgus*	4	A
Crustacea	*Paracalliope*	5	C
	Phreatogammarus	5	R
Ephemeroptera (Mayflies)	*Austroclima*	7	C
	Coloburiscus	7	C
	Deleatidium	8	C
	Zephlebia group	7	R
Plecoptera (Stoneflies)	*Zelandobius*	5	R
Coleoptera (Beetles)	Elmidae	6	A
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	VA
	Costachorema	7	C
	Hydrobiosis	5	C
	Pycnocentria	7	C
	Pycnocentrodes	5	A
Diptera (True Flies)	*Aphrophila*	5	C
	Orthocladiinae	2	C
	Tanytarsini	3	R
	Muscidae	3	R
	Austrosimulium	3	R
		Number of Taxa	21
		Taranaki MCI	101
		Taranaki SQMCI	4.4
		EPT (taxa)	10
		% EPT (taxa)	48

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

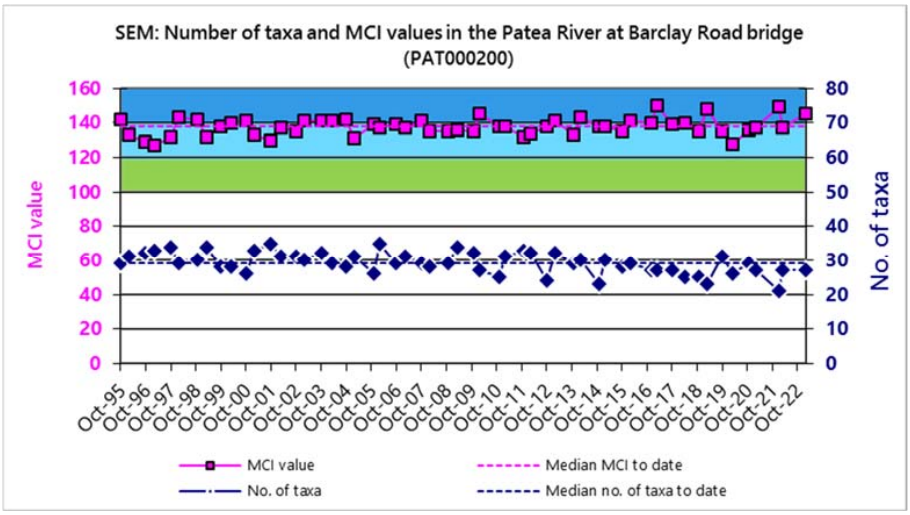


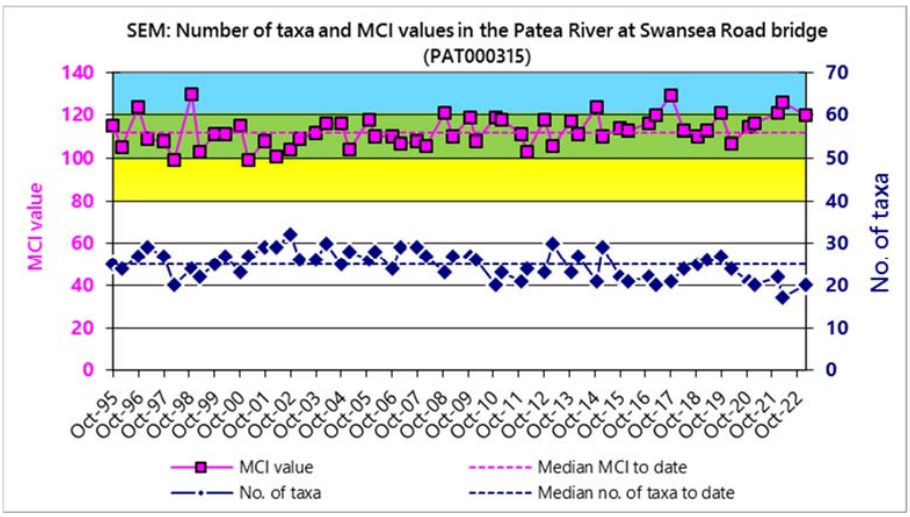
Pātea

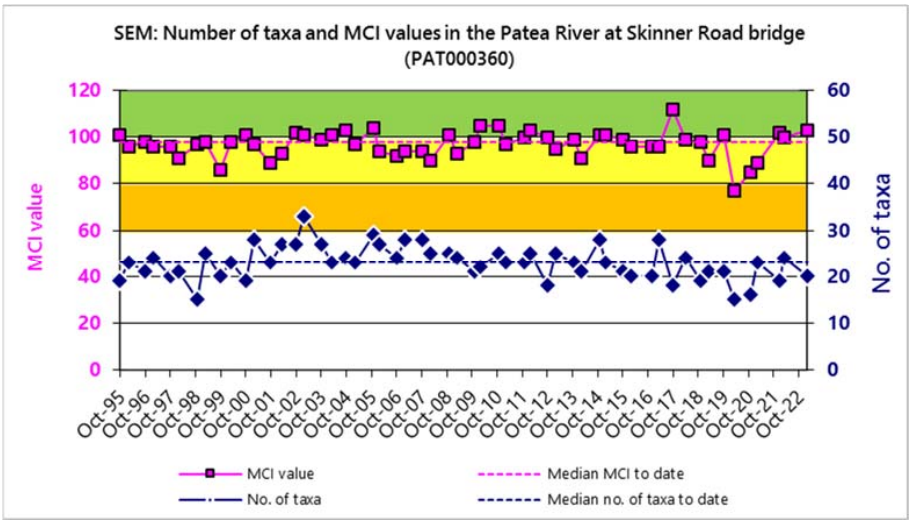
Taxa List	Site Code	Taranaki MCI Score	PAT000200	PAT000315	PAT000360
	Sample Number		TRC2310387	TRC2310388	TRC2310389
Annelida (Worms)	Oligochaeta	1	-	R	R
	Lumbricidae	5	R	-	-
Mollusca	*Potamopyrgus*	4	R	C	R
Ephemeroptera (Mayflies)	*Acanthophlebia*	9	R	-	-
	Ameletopsis	10	R	-	-
	Austroclima	7	R	C	-
	Coloburiscus	7	VA	A	C
	Deleatidium	8	XA	VA	VA
	Nesameletus	9	A	A	R
	Zephlebia group	7	-	R	-
Plecoptera (Stoneflies)	*Austroperla*	9	R	-	-
	Megaleptoperla	9	C	-	-
	Stenoperla	10	C	-	-
	Zelandoperla	8	A	R	-
Coleoptera (Beetles)	Elmidae	6	VA	A	VA
	Hydraenidae	8	C	C	-
	Hydrophilidae	5	R	-	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	A	A	A
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	-	A	VA
	Costachorema	7	C	R	R
	Hydrobiosis	5	C	C	A
	Hydrobiosella	9	R	-	-
	Neurochorema	6	R	R	R
	Hydropsyche (Orthopsyche)	9	C	-	-
	Helicopsyche	10	R	-	-
	Olinga	9	VA	R	R
	Pycnocentria	7	R	-	-
	Pycnocentrodes	5	-	R	C
Diptera (True Flies)	*Aphrophila*	5	A	A	VA
	Eriopterini	5	R	R	C
	Maoridiamesa	3	-	-	C
	Orthocladiinae	2	-	C	A
	Polypedilum	3	R	-	-
	Tanytarsini	3	-	-	A
	Muscidae	3	-	-	R
	Tanyderidae	4	-	-	R
		Number of Taxa	27	20	20
		Taranaki MCI	145	120	103
		Taranaki SQMCI	7.7	6.9	5.5
		EPT (taxa)	18	12	9
		% EPT (taxa)	67	60	45

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Patea River at Barclay Road bridge (PAT000200)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Patea River at Swansea Road bridge (PAT000315)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

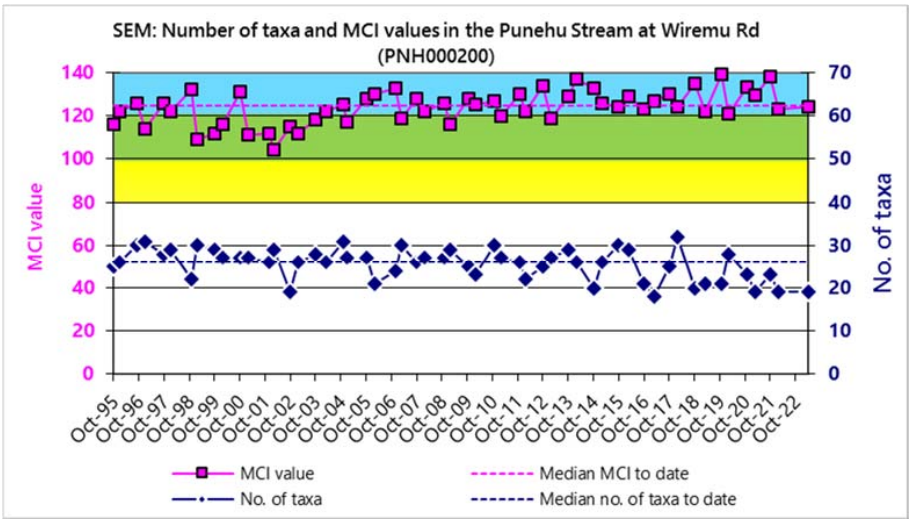

SEM: Number of taxa and MCI values in the Patea River at Skinner Road bridge (PAT000360)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

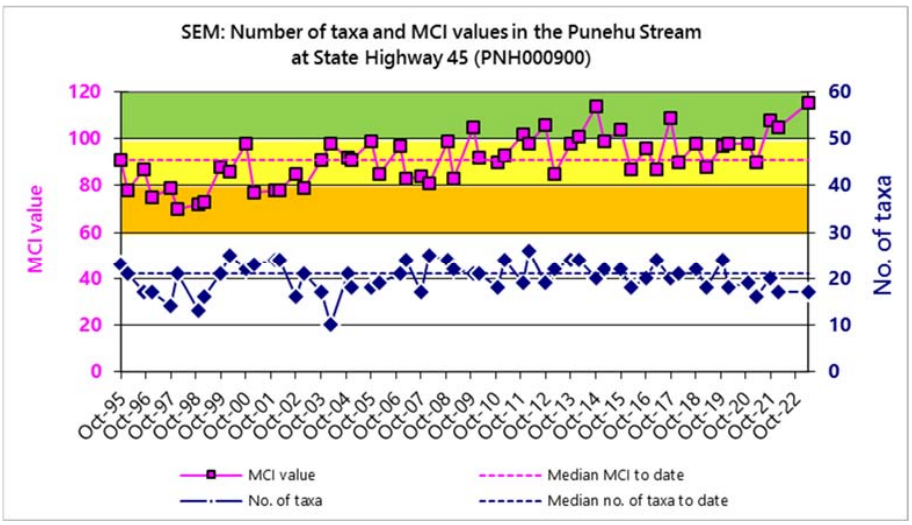
Pūnehu

Taxa List	Site Code	Taranaki MCI Score	PNH000200	PNH000900
	Sample Number		TRC2310390	TRC2310391
Mollusca	*Potamopyrgus*	4	-	A
Ephemeroptera (Mayflies)	*Austroclima*	7	-	C
	Coloburiscus	7	C	C
	Deleatidium	8	XA	VA
	Nesameletus	9	VA	C
Plecoptera (Stoneflies)	*Megaleptoperla*	9	R	-
	Zelandoperla	8	C	-
Coleoptera (Beetles)	Elmidae	6	VA	VA
	Hydraenidae	8	R	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	C	C
	Costachorema	7	C	-
	Hydrobiosis	5	R	R
	Beraeoptera	8	A	-
	Hudsonema	6	-	R
	Olinga	9	R	R
	Pycnocentria	7	-	R
	Pycnocentrodes	5	C	VA
Diptera (True Flies)	*Aphrophila*	5	C	R
	Eriopterini	5	C	-
	Maoridiamesa	3	A	-
	Orthocladiinae	2	A	-
	Polypedilum	3	-	R
	Tanytarsini	3	-	R
	Austrosimulium	3	R	R
		Number of Taxa	19	17
		Taranaki MCI	124	115
		Taranaki SQMCI	7.5	6.2
		EPT (taxa)	11	10
		% EPT (taxa)	58	59

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Punehu Stream at Wiremu Rd (PNH000200)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

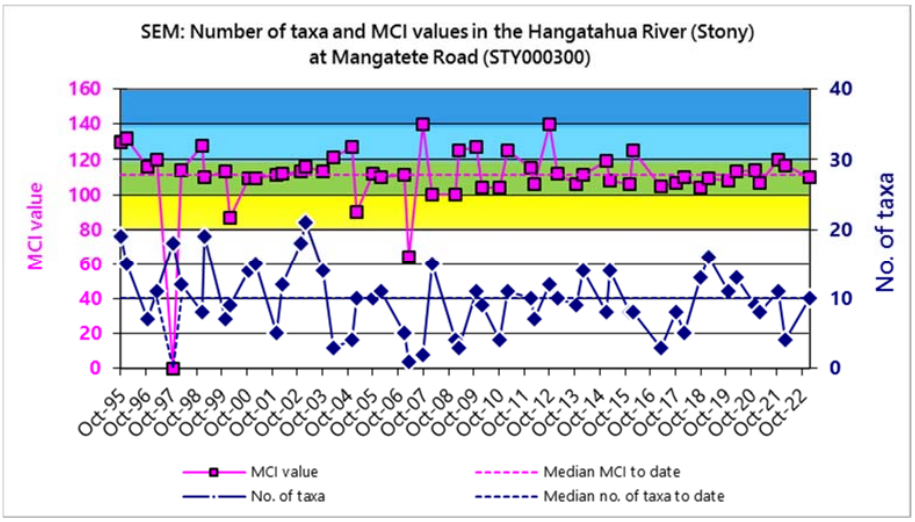

SEM: Number of taxa and MCI values in the Punehu Stream at State Highway 45 (PNH000900)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

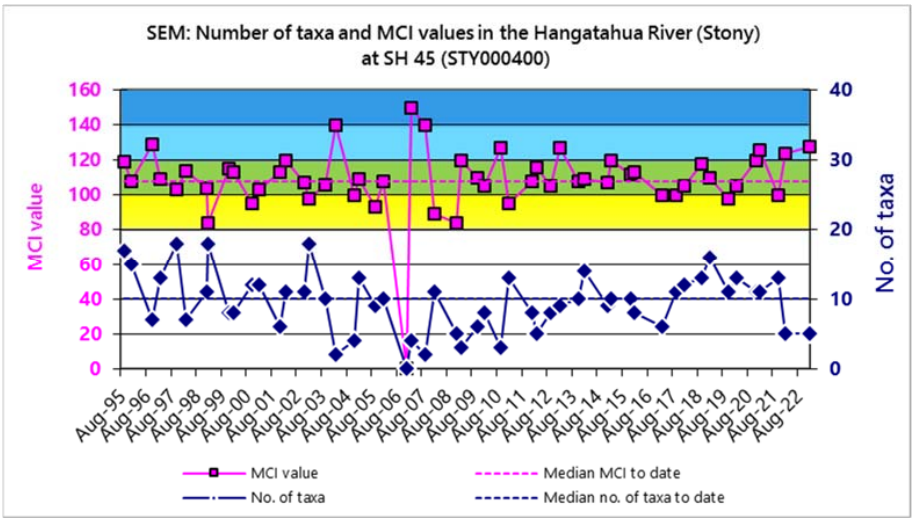
Stony

Taxa List	Site Code	Taranaki MCI Score	STY000300	STY000400
	Sample Number		TRC2310362	TRC2310363
Ephemeroptera (Mayflies)	*Deleatidium*	8	XA	VA
Plecoptera (Stoneflies)	*Zelandoperla*	8	VA	A
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	R	R
	Costachorema	7	A	C
	Hydrobiosis	5	R	R
	Psilochorema	6	R	-
	Pycnocentrodes	5	R	-
Diptera (True Flies)	*Aphrophila*	5	R	-
	Maoridiamesa	3	R	-
	Polypedilum	3	R	-
		Number of Taxa	10	5
		Taranaki MCI	108	128
		Taranaki SQMCI	7.9	7.9
		EPT (taxa)	7	5
		% EPT (taxa)	70	100

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Hangatahua River (Stony) at Mangatete Road (STY000300)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

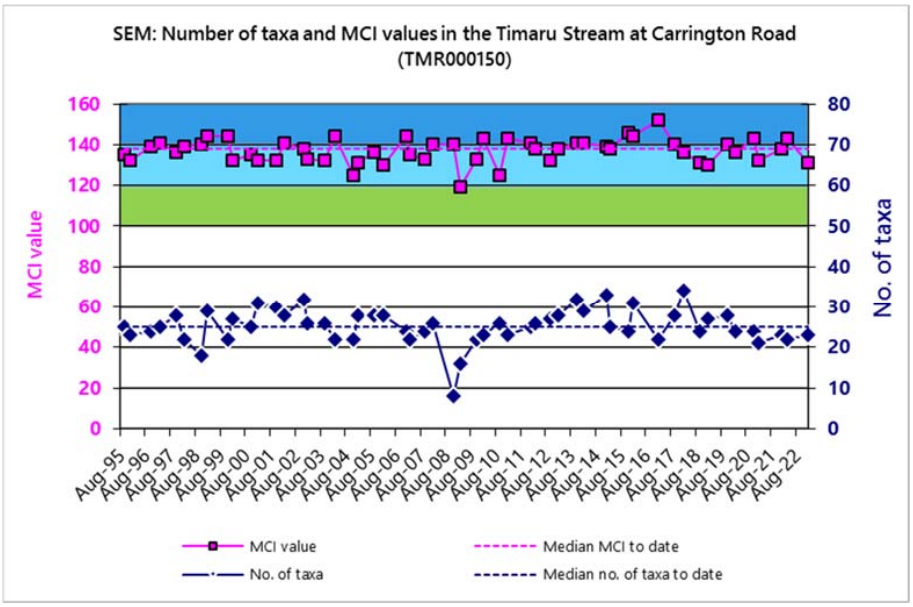

SEM: Number of taxa and MCI values in the Hangatahua River (Stony) at SH 45 (STY000400)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

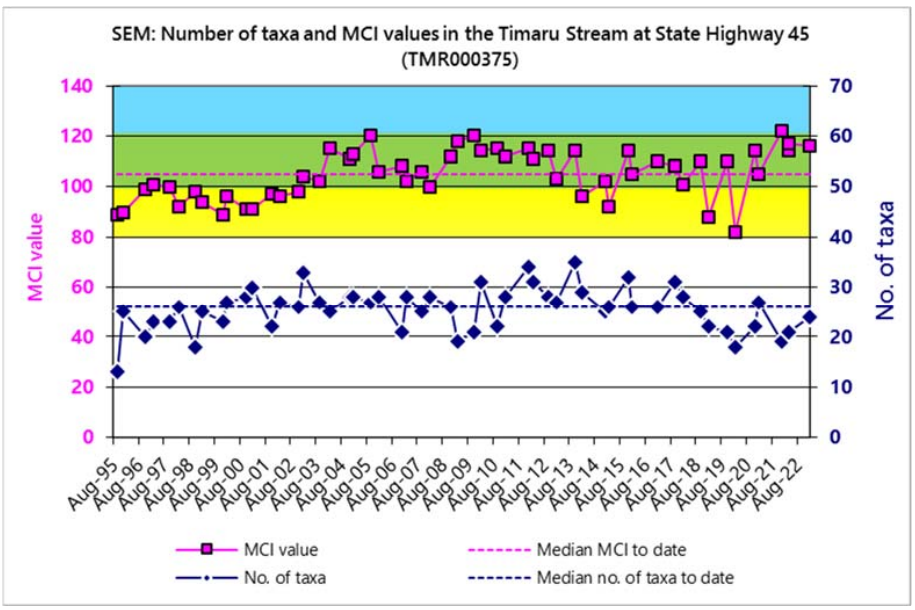
Timaru

Taxa List	Site Code	Taranaki MCI Score	TMR000150	TMR000375
	Sample Number		TRC2310395	TRC2310396
Mollusca	*Potamopyrgus*	4	-	R
Ephemeroptera (Mayflies)	*Acanthophlebia*	9	R	-
	Ameletopsis	10	R	-
	Austroclima	7	-	A
	Coloburiscus	7	A	A
	Deleatidium	8	VA	C
	Nesameletus	9	C	-
	Rallidens	9	-	R
Plecoptera (Stoneflies)	*Austroperla*	9	R	-
	Stenoperla	10	C	-
	Zelandobius	5	R	-
	Zelandoperla	8	C	R
Coleoptera (Beetles)	Elmidae	6	C	VA
	Hydraenidae	8	-	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	A
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	C	A
	Costachorema	7	R	R
	Hydrobiosis	5	C	C
	Hydrobiosella	9	VA	-
	Neurochorema	6	-	A
	Psilochorema	6	R	-
	Beraeoptera	8	-	R
	Olinga	9	R	R
	Pycnocentria	7	-	R
	Pycnocentrodes	5	-	C
Diptera (True Flies)	*Aphrophila*	5	A	A
	Eriopterini	5	R	-
	Hexatomini	5	R	-
	Maoridiamesa	3	R	R
	Orthocladiinae	2	R	C
	Polypedilum	3	R	-
	Tanytarsini	3	-	A
	Muscidae	3	-	R
	Austrosimulium	3	-	R
Acarina (Mites)	Acarina	5	-	R
		Number of Taxa	23	24
		Taranaki MCI	131	116
		Taranaki SQMCI	7.9	5.7
		EPT (taxa)	15	13
		% EPT (taxa)	65	54

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Timaru Stream at Carrington Road (TMR000150)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

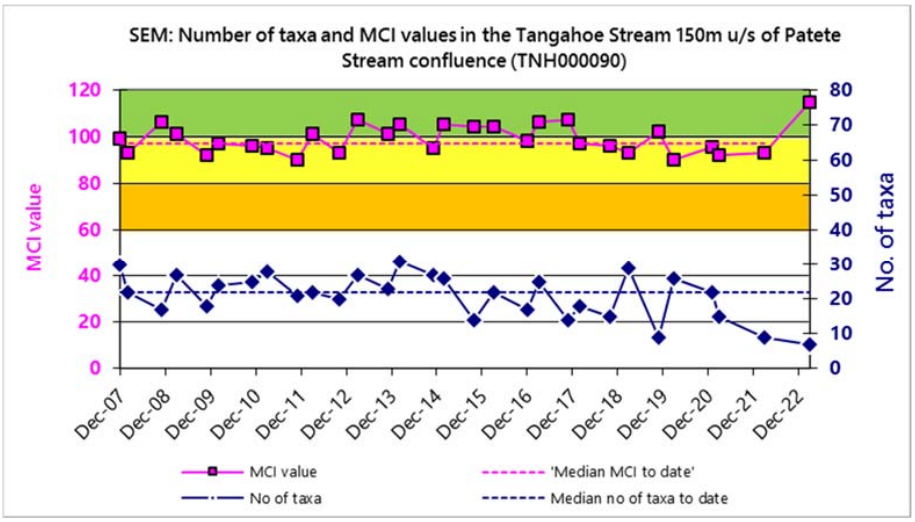

SEM: Number of taxa and MCI values in the Timaru Stream at State Highway 45 (TMR000375)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

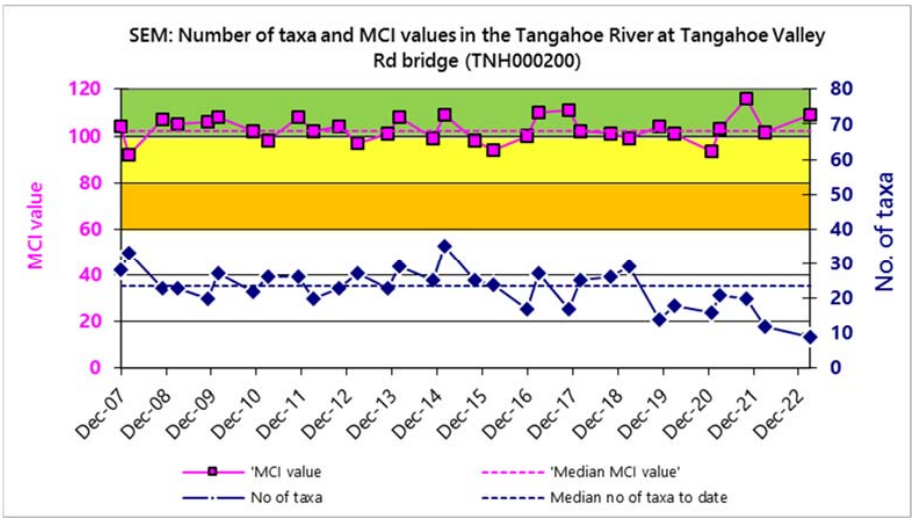
Tāngāhoe

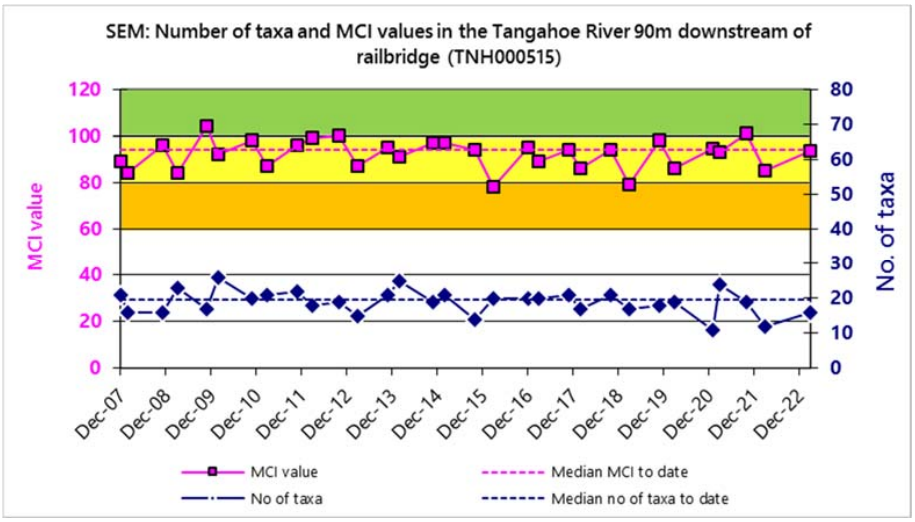
Taxa List	Site Code	Taranaki MCI Score	TNH000090	TNH000200	TNH000515
	Sample Number		TRC2310392	TRC2310393	TRC2310394
Annelida (Worms)	Oligochaeta	1	-	-	R
Mollusca	*Potamopyrgus*	4	VA	R	R
Crustacea	*Paracalliope*	5	-	-	R
	Paratya	3	-	-	C
Ephemeroptera (Mayflies)	*Austroclima*	7	C	-	R
	Coloburiscus	7	-	R	R
	Deleatidium	8	A	VA	C
	Zephlebia group	7	R	-	-
Plecoptera (Stoneflies)	*Zelandobius*	5	-	-	R
Coleoptera (Beetles)	Elmidae	6	R	C	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	-	R	-
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	-	R	C
	Costachorema	7	-	-	R
	Hydrobiosis	5	R	R	R
Diptera (True Flies)	*Aphrophila*	5	-	R	-
	Eriopterini	5	-	-	R
	Orthocladiinae	2	-	-	A
	Polypedilum	3	-	-	R
	Tanytarsini	3	-	-	R
	Austrosimulium	3	C	R	-
		Number of Taxa	7	9	16
		Taranaki MCI	114	109	94
		Taranaki SQMCI	4.7	7.7	3.7
		EPT (taxa)	4	4	7
		% EPT (taxa)	57	44	44

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Tangahoe Stream 150m u/s of Patete Stream confluence (TNH000090)
MCI value
No. of taxa
120
100
80
60
40
20
0
80
70
60
50
40
30
20
10
0
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Dec-22
MCI value
'Median MCI to date'
No of taxa
Median no of taxa to date


SEM: Number of taxa and MCI values in the Tangahoe River at Tangahoe Valley Rd bridge (TNH000200)
MCI value
No. of taxa
120
100
80
60
40
20
0
80
70
60
50
40
30
20
10
0
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Dec-22
'MCI value
'Median MCI value'
No of taxa
Median no of taxa to date

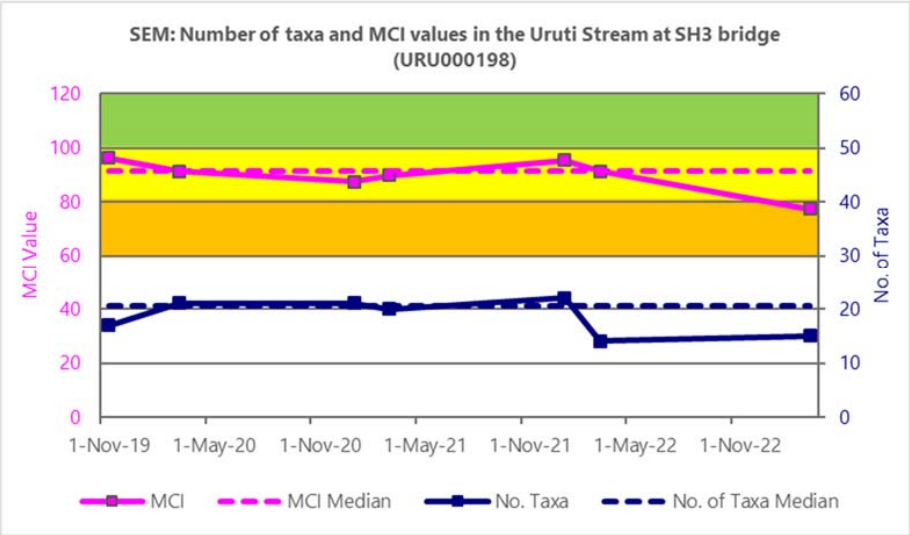

SEM: Number of taxa and MCI values in the Tangahoe River 90m downstream of railbridge (TNH000515)
MCI value
No. of taxa
120
100
80
60
40
20
0
80
70
60
50
40
30
20
10
0
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Dec-22
MCI value
Median MCI to date
No of taxa
Median no of taxa to date

Uruti

Taxa List	Site Code / Sample Number	Taranaki MCI Score	URU000198 / TRC2310397
Nemertea	Nemertea	3	R
Annelida (Worms)	Oligochaeta	1	R
Mollusca	*Latia*	5	C
	Potamopyrgus	4	A
Crustacea	*Paratya*	3	R
Ephemeroptera (Mayflies)	*Austroclima*	7	C
	Zephlebia group	7	R
Coleoptera (Beetles)	Elmidae	6	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	R
	Oxyethira	2	R
Diptera (True Flies)	*Aphrophila*	5	C
	Orthocladiinae	2	A
	Polypedilum	3	C
	Empididae	3	R
	Austrosimulium	3	R
		Number of Taxa	15
		Taranaki MCI	77
		Taranaki SQMCI	3.8
		EPT (taxa)	3
		% EPT (taxa)	20

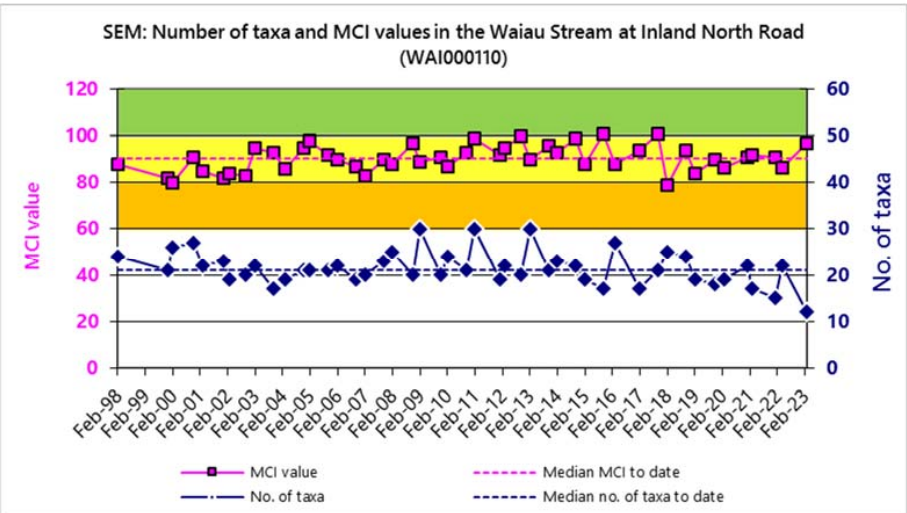
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant



Waiau

Taxa List	Site Code	Taranaki MCI Score	WAI000110
	Sample Number		TRC2310398
Annelida (Worms)	Oligochaeta	1	C
Mollusca	*Latia*	5	R
	Potamopyrgus	4	VA
Crustacea	*Paracalliope*	5	A
Ephemeroptera (Mayflies)	*Austroclima*	7	A
Coleoptera (Beetles)	Elmidae	6	A
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	C
	Hydrobiosis	5	R
	Hudsonema	6	C
	Pycnocentria	7	A
	Pycnocentrodes	5	A
Diptera (True Flies)	*Maoridiamesa*	3	R
		Number of Taxa	12
		Taranaki MCI	97
		Taranaki SQMCI	4.9
		EPT (taxa)	6
		% EPT (taxa)	50
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa	
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant			

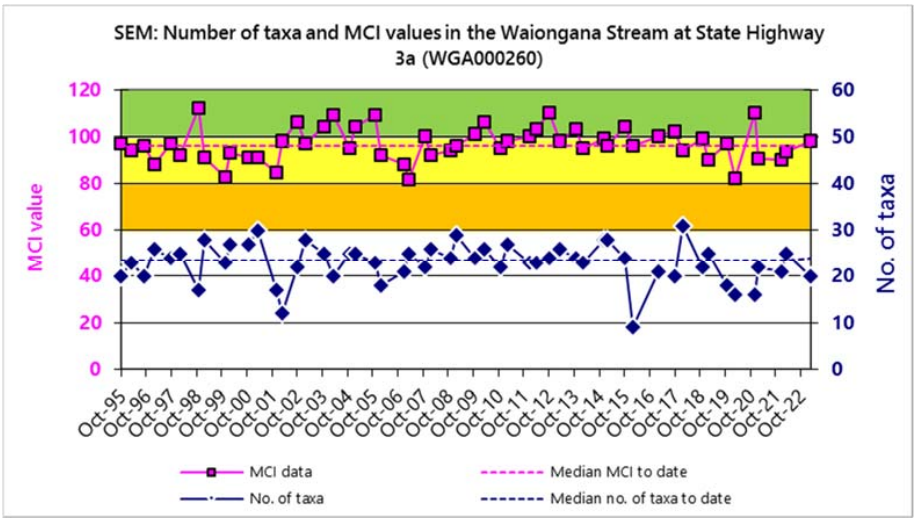


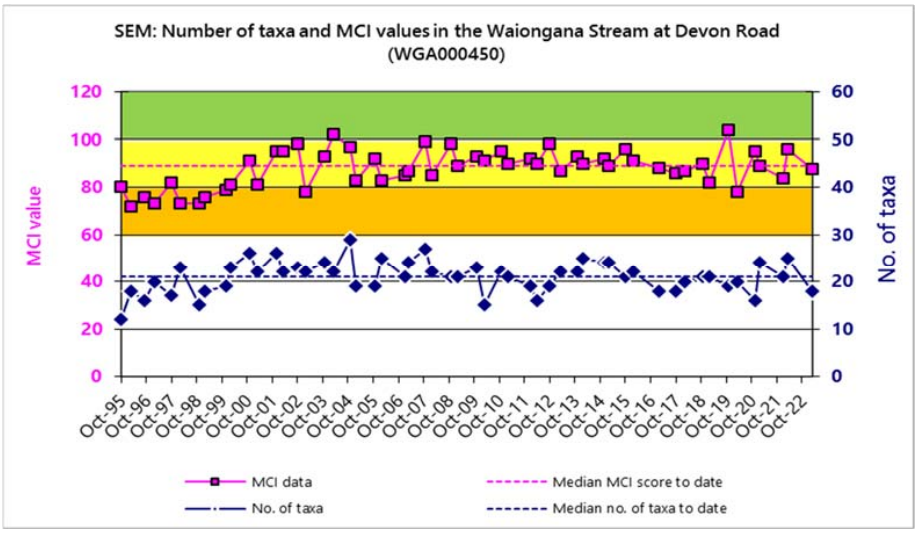
Waiongana

Taxa List	Site Code / Sample Number	Taranaki MCI Score	WGA000260 TRC2310581	WGA000450 TRC2310582
Nemertea	Nemertea	3	R	R
Annelida (Worms)	Oligochaeta	1	C	A
Mollusca	*Latia*	5	-	R
	Potamopyrgus	4	A	VA
Crustacea	Paraleptamphopus	5	R	-
Ephemeroptera (Mayflies)	*Austroclima*	7	C	C
	Coloburiscus	7	R	-
	Deleatidium	8	R	-
	Zephlebia group	7	R	R
Coleoptera (Beetles)	Elmidae	6	A	A
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A	A
	Costachorema	7	R	-
	Hydrobiosis	5	C	C
	Neurochorema	6	C	C
	Pycnocentrodes	5	C	C
Diptera (True Flies)	*Aphrophila*	5	A	R
	Maoridiamesa	3	R	R
	Orthocladiinae	2	A	A
	Tanytarsini	3	VA	A
	Muscidae	3	R	R
	Austrosimulium	3	-	C
		Number of Taxa	20	18
		Taranaki MCI	98	88
		Taranaki SQMCI	3.9	3.8
		EPT (taxa)	9	6
		% EPT (taxa)	45	33

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Waiongana Stream at State Highway 3a (WGA000260)
MCI value
No. of taxa
MCI data
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Waiongana Stream at Devon Road (WGA000450)
MCI value
No. of taxa
MCI data
Median MCI score to date
No. of taxa
Median no. of taxa to date

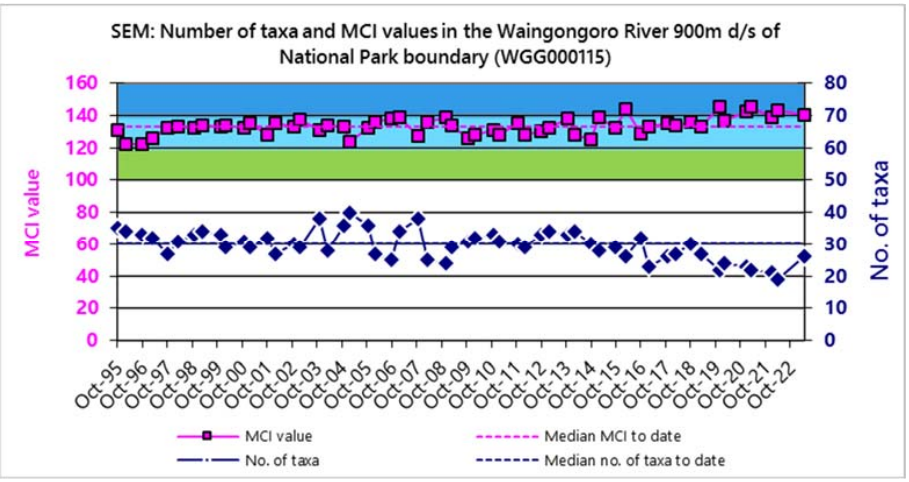
Waingongoro

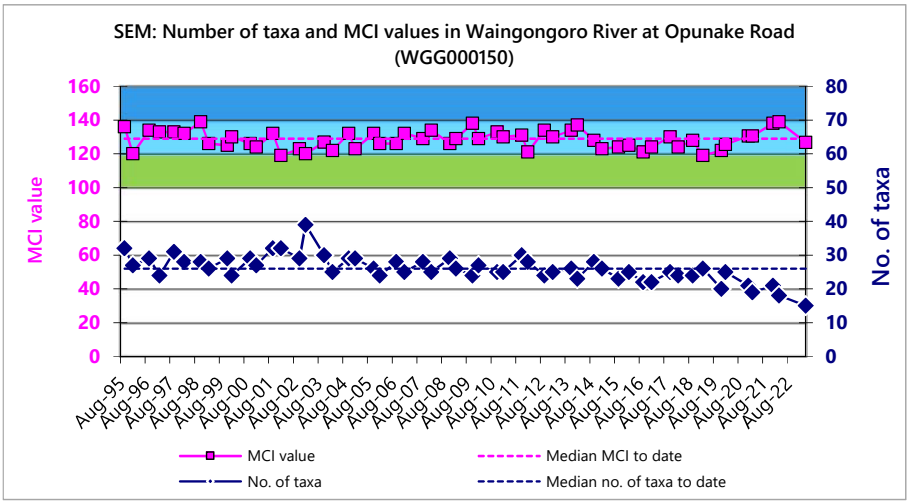
Taxa List	Site Code	Taranaki MCI Score	WGG000115	WGG000150	WGG000500	WGG000665	WGG000895	WGG000995
	Sample Number		TRC2310402	TRC2310403	TRC2310404	TRC2310405	TRC2310406	TRC2310407
Platyhelminthes (Flatworms)	*Cura*	3	-	-	-	-	-	R
Nemertea	Nemertea	3	-	-	-	-	-	R
Annelida (Worms)	Oligochaeta	1	-	-	R	R	C	C
	Lumbricidae	5	-	-	-	R	R	R
Mollusca	*Latia*	5	-	-	-	-	R	-
	Potamopyrgus	4	-	-	-	C	VA	C
Crustacea	*Paracalliope*	5	-	-	-	-	C	-
	Paratya	3	-	-	-	-	-	C
Ephemeroptera (Mayflies)	*Ameletopsis*	10	R	-	-	-	-	-
	Austroclima	7	-	-	-	-	R	-
	Coloburiscus	7	VA	VA	A	A	A	R
	Deleatidium	8	VA	VA	XA	XA	A	C
	Nesameletus	9	A	C	-	-	-	-
	Zephlebia group	7	R	R	-	-	-	R
Plecoptera (Stoneflies)	*Austroperla*	9	R	-	-	-	-	-
	Megaleptoperla	9	C	-	-	-	-	-
	Stenoperla	10	R	-	-	-	-	-
	Zelandobius	5	-	-	-	R	-	R
	Zelandoperla	8	A	C	-	-	-	-
Coleoptera (Beetles)	Elmidae	6	A	A	A	A	VA	A
	Hydraenidae	8	C	C	R	-	-	-
	Ptilodactylidae	8	R	-	-	-	-	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	A	C	R	R	C	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	R	C	A	A	XA	VA
	Costachorema	7	-	-	-	R	R	R
	Hydrobiosis	5	C	C	C	C	R	C
	Neurochorema	6	-	-	-	-	C	-
	Hydropsyche (Orthopsyche)	9	C	-	-	-	-	-
	Psilochorema	6	R	R	-	-	-	-
	Beraeoptera	8	VA	VA	C	C	-	-
	Helicopsyche	10	R	-	-	-	-	-
	Olinga	9	A	-	-	-	-	-
	Pycnocentrodes	5	R	-	C	R	A	C
Diptera (True Flies)	*Aphrophila*	5	C	A	R	R	A	R
	Eriopterini	5	R	R	C	C	-	-
	Hexatomini	5	R	-	-	-	-	-
	Maoridiamesa	3	-	-	-	-	C	R
	Orthocladiinae	2	R	R	R	-	A	C
	Polypedilum	3	R	-	-	-	-	-
	Tanypodinae	5	-	-	-	-	R	-
	Tanytarsini	3	-	-	-	-	R	-
	Muscidae	3	-	-	-	-	R	-
	Austrosimulium	3	-	-	-	R	-	R
	Tanyderidae	4	-	-	R	-	-	-

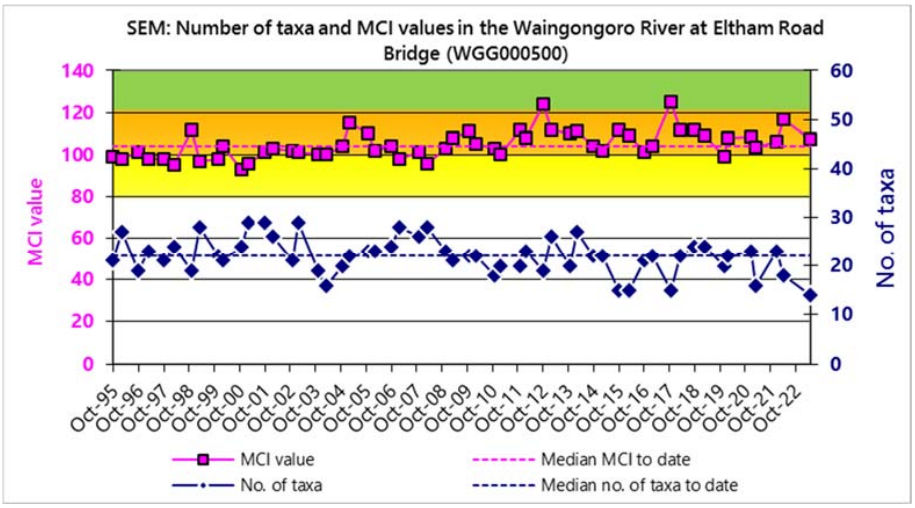
Taxa List	Site Code	Taranaki MCI Score	WGG000115	WGG000150	WGG000500	WGG000665	WGG000895	WGG000995
	Sample Number		TRC2310402	TRC2310403	TRC2310404	TRC2310405	TRC2310406	TRC2310407
Number of Taxa			26	15	14	16	21	20
Taranaki MCI			140	127	107	106	98	93
Taranaki SQMCI			7.6	7.3	7.6	7.6	4.4	4.3
EPT (taxa)			17	9	6	8	8	8
% EPT (taxa)			65	60	43	50	38	40

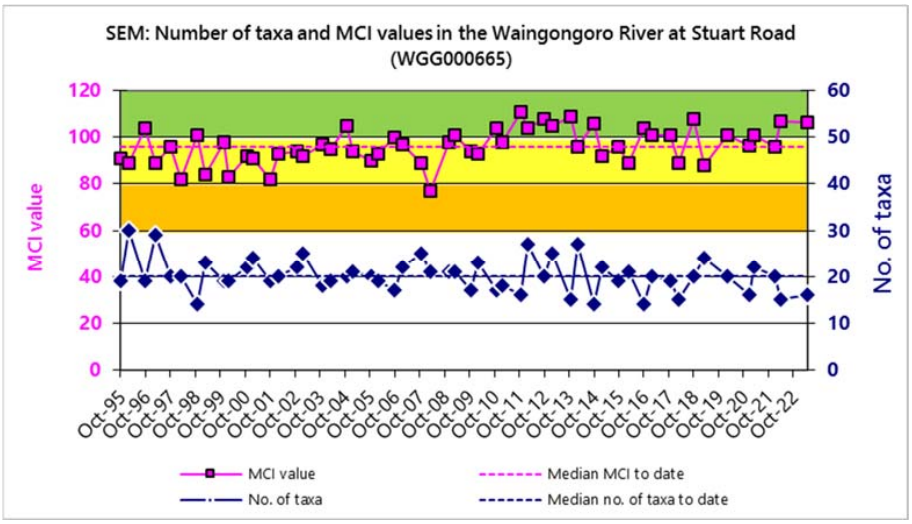
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

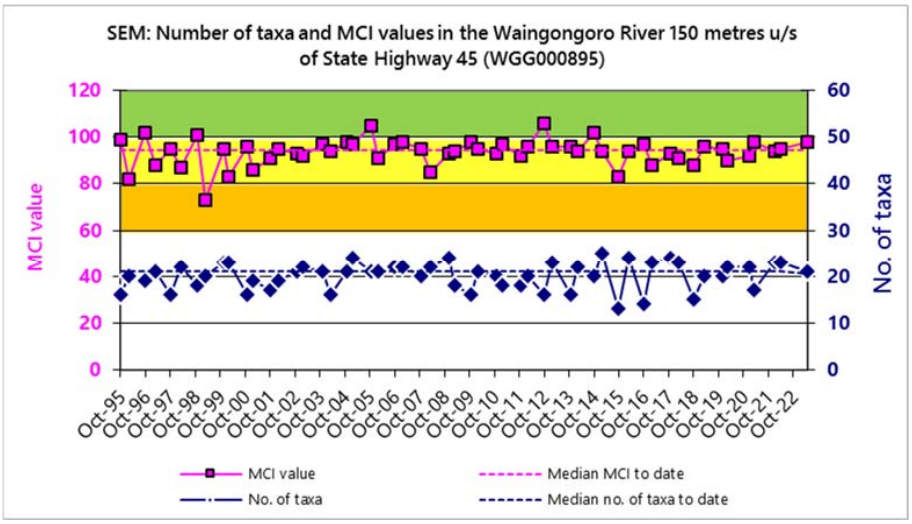
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

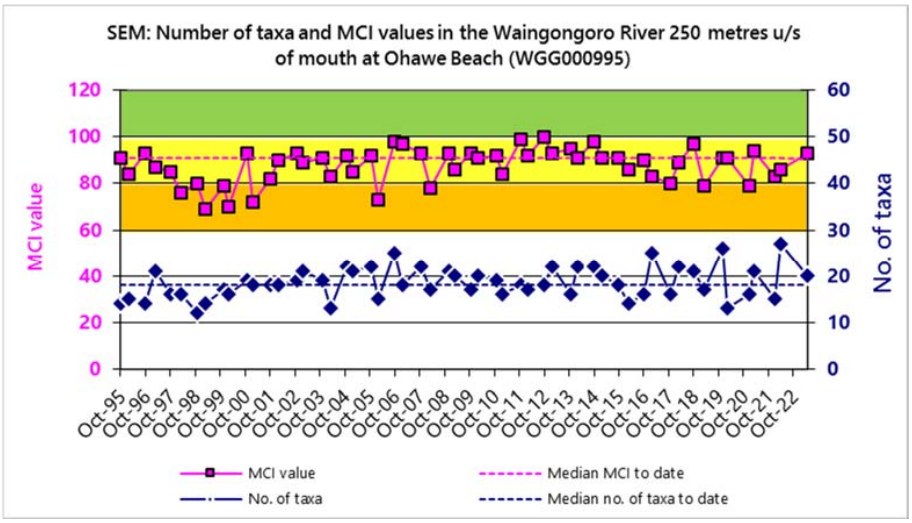




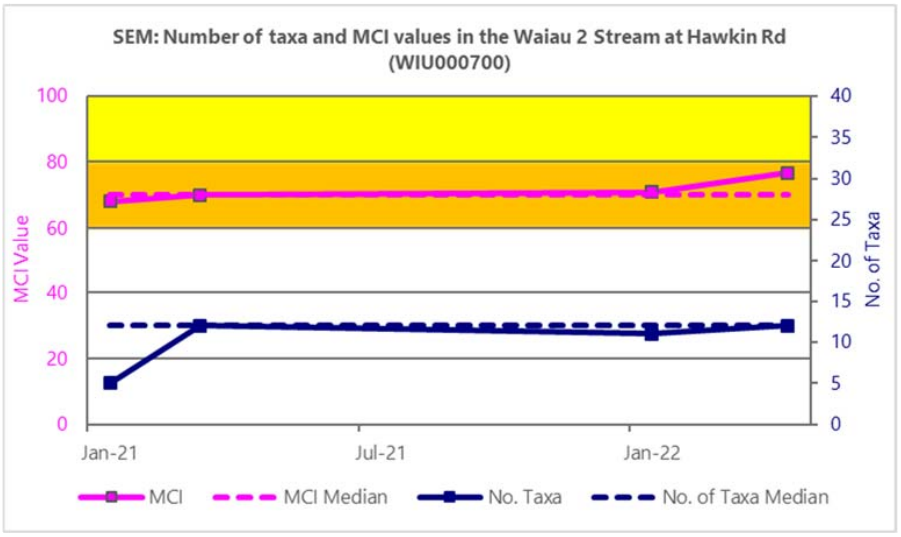

SEM: Number of taxa and MCI values in the Waingongoro River at Eltham Road Bridge (WGG000500)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Waingongoro River at Stuart Road (WGG000665)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Waingongoro River 150 metres u/s of State Highway 45 (WGG000895)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Waingongoro River 250 metres u/s of mouth at Ohawe Beach (WGG000995)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

Waiau 2

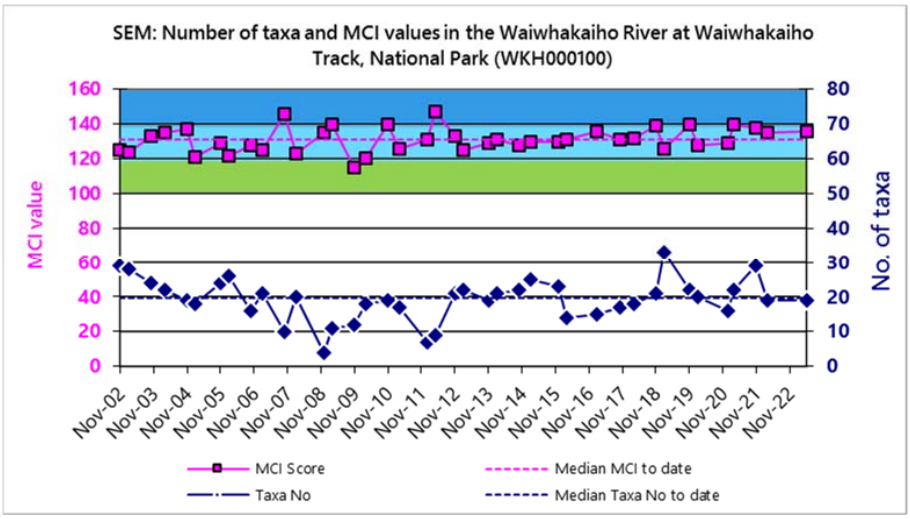

SEM: Number of taxa and MCI values in the Waiau 2 Stream at Hawkin Rd (WIU000700)
MCI Value
No. of Taxa
Jan-21
Jul-21
Jan-22
MCI
MCI Median
No. Taxa
No. of Taxa Median

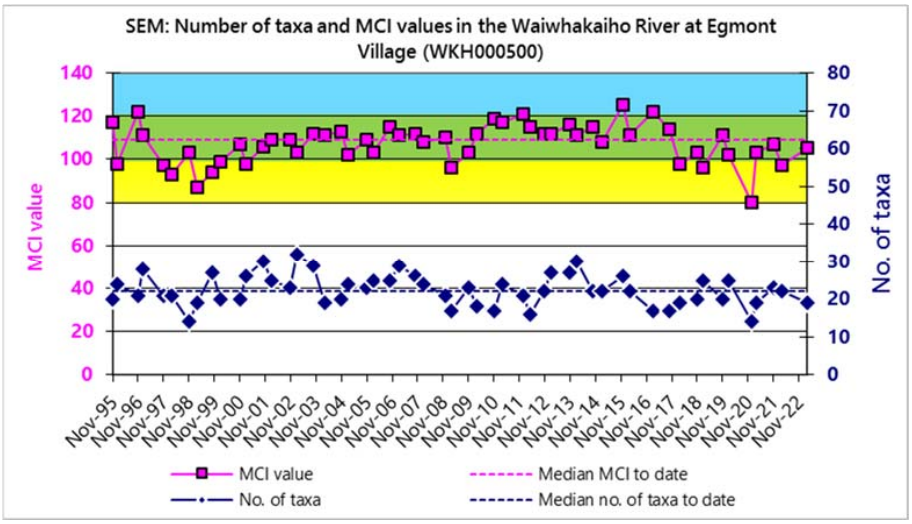
Waiwhakaiho

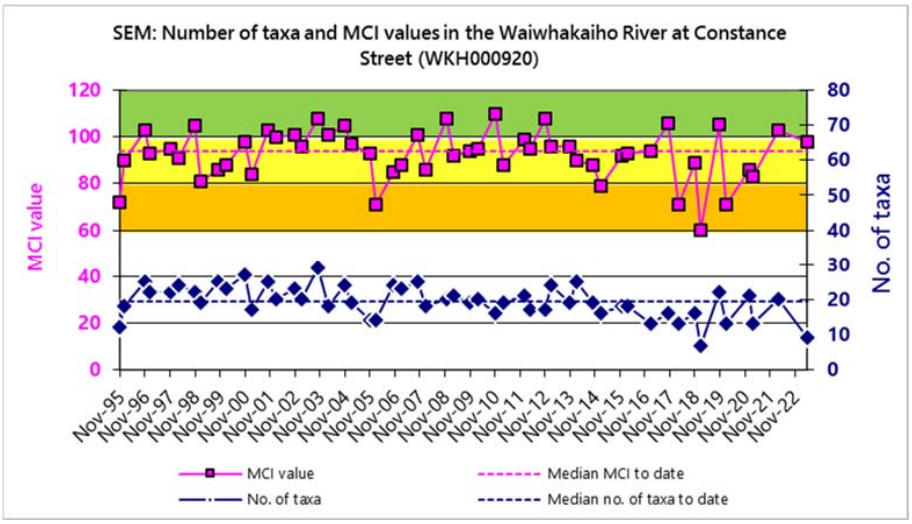
Taxa List	Site Code / Sample Number	Taranaki MCI Score	WKH000500 TRC2310102	WKH000920 TRC2310995	WKH000950 TRC2310996	WKH000100 TRC2310998
Nematomorpha	Nematomorpha	3	-	R	-	-
Annelida (Worms)	Oligochaeta	1	-	-	R	-
Mollusca	*Potamopyrgus*	4	-	R	C	-
Crustacea	*Paratya*	3	-	-	C	-
Ephemeroptera (Mayflies)	*Austroclima*	7	R	-	-	-
	Coloburiscus	7	C	-	R	A
	Deleatidium	8	A	R	C	VA
	Nesameletus	9	A	-	-	C
Plecoptera (Stoneflies)	*Spaniocerca*	8	-	-	-	R
	Zelandoperla	8	-	-	-	A
Hemiptera (Bugs)	*Saldidae*	5	R	-	-	-
Coleoptera (Beetles)	Elmidae	6	A	R	R	A
	Hydraenidae	8	R	-	-	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	-	-	-
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A	A	A	R
	Costachorema	7	C	C	C	R
	Hydrobiosis	5	C	-	R	R
	Hydrochorema	9	-	-	-	R
	Neurochorema	6	C	-	-	-
	Psilochorema	6	-	-	-	R
	Beraeoptera	8	-	-	-	C
	Confluens	5	-	R	-	-
	Helicopsyche	10	-	-	-	C
	Olinga	9	-	-	-	C
	Oxyethira	2	R	-	-	-
	Pycnocentria	7	-	-	-	R
	Pycnocentrodes	5	-	R	-	-
Diptera (True Flies)	*Aphrophila*	5	A	-	-	A
	Maoridiamesa	3	VA	-	-	R
	Orthocladiinae	2	A	A	A	R
	Tanytarsini	3	VA	-	R	-
	Muscidae	3	C	-	-	-
	Austrosimulium	3	R	-	-	-
Number of Taxa			19	9	11	19
Taranaki MCI			105	98	91	136
Taranaki SQMCI			4.2	3.6	3.9	7.4
EPT (taxa)			8	5	5	14
% EPT (taxa)			42	56	45	74

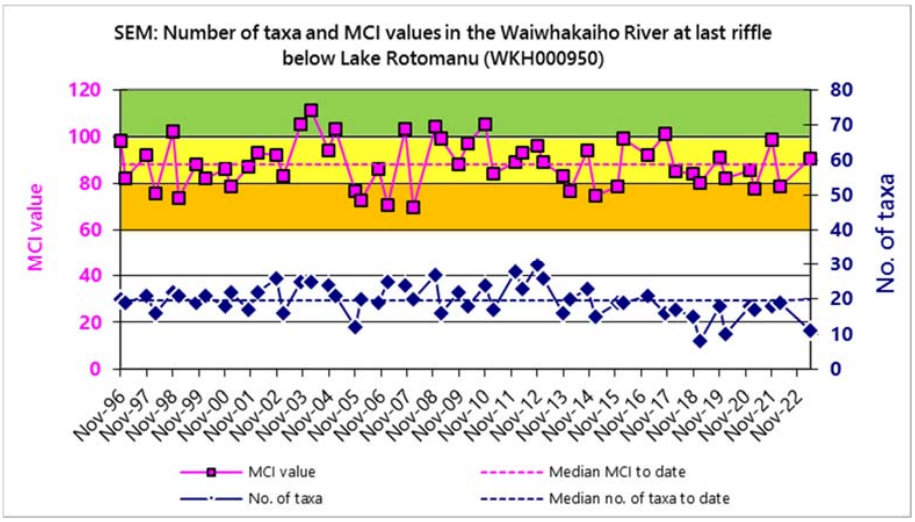
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant
XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Waiwhakaiho River at Waiwhakaiho Track, National Park (WKH000100)
MCI value
No. of taxa
MCI Score
Median MCI to date
Taxa No
Median Taxa No to date


SEM: Number of taxa and MCI values in the Waiwhakaiho River at Egmont Village (WKH000500)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date


SEM: Number of taxa and MCI values in the Waiwhakaiho River at Constance Street (WKH000920)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

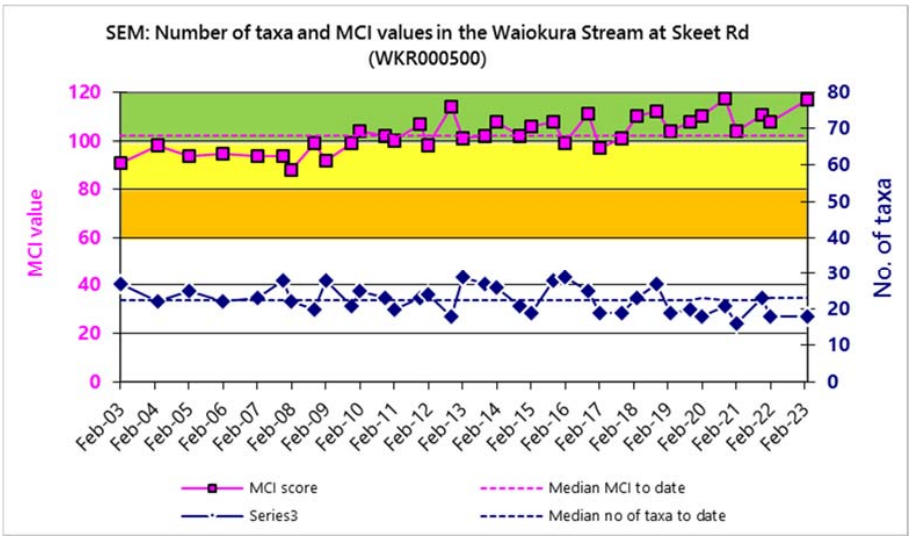

SEM: Number of taxa and MCI values in the Waiwhakaiho River at last riffle below Lake Rotomanu (WKH000950)
MCI value
No. of taxa
120
100
80
60
40
20
0
80
70
60
50
40
30
20
10
0
Nov-96
Nov-97
Nov-98
Nov-99
Nov-00
Nov-01
Nov-02
Nov-03
Nov-04
Nov-05
Nov-06
Nov-07
Nov-08
Nov-09
Nov-10
Nov-11
Nov-12
Nov-13
Nov-14
Nov-15
Nov-16
Nov-17
Nov-18
Nov-19
Nov-20
Nov-21
Nov-22
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

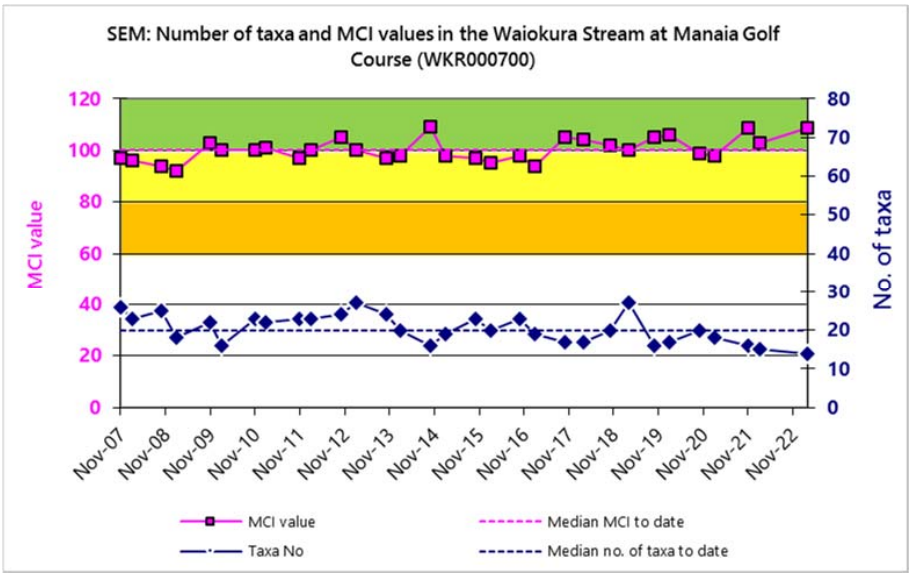
Waiokura

Taxa List	Site Code	Taranaki MCI Score	WKR000500	WKR000700
	Sample Number		TRC2310408	TRC2310409
Annelida (Worms)	Oligochaeta	1	-	R
	Lumbricidae	5	R	-
Mollusca	*Potamopyrgus*	4	C	C
Crustacea	*Paracalliope*	5	-	R
	Paranephrops	5	R	R
Ephemeroptera (Mayflies)	*Austroclima*	7	VA	VA
	Coloburiscus	7	A	A
	Deleatidium	8	R	-
	Zephlebia group	7	C	A
Coleoptera (Beetles)	Elmidae	6	A	A
	Ptilodactylidae	8	R	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	C	C
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A	A
	Costachorema	7	R	-
	Hydrobiosis	5	R	R
	Confluens	5	R	R
	Olinga	9	-	R
	Pycnocentria	7	C	-
Diptera (True Flies)	*Aphrophila*	5	C	-
	Eriopterini	5	R	-
	Austrosimulium	3	R	-
	Tanyderidae	4	-	C
		Number of Taxa	18	14
		Taranaki MCI	117	109
		Taranaki SQMCI	6.4	6.4
		EPT (taxa)	9	7
		% EPT (taxa)	50	50

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Waiokura Stream at Skeet Rd (WKR000500)
MCI value
No. of taxa
120
100
80
60
40
20
0
80
70
60
50
40
30
20
10
0
Feb-03
Feb-04
Feb-05
Feb-06
Feb-07
Feb-08
Feb-09
Feb-10
Feb-11
Feb-12
Feb-13
Feb-14
Feb-15
Feb-16
Feb-17
Feb-18
Feb-19
Feb-20
Feb-21
Feb-22
Feb-23
MCI score
Median MCI to date
Series3
Median no of taxa to date

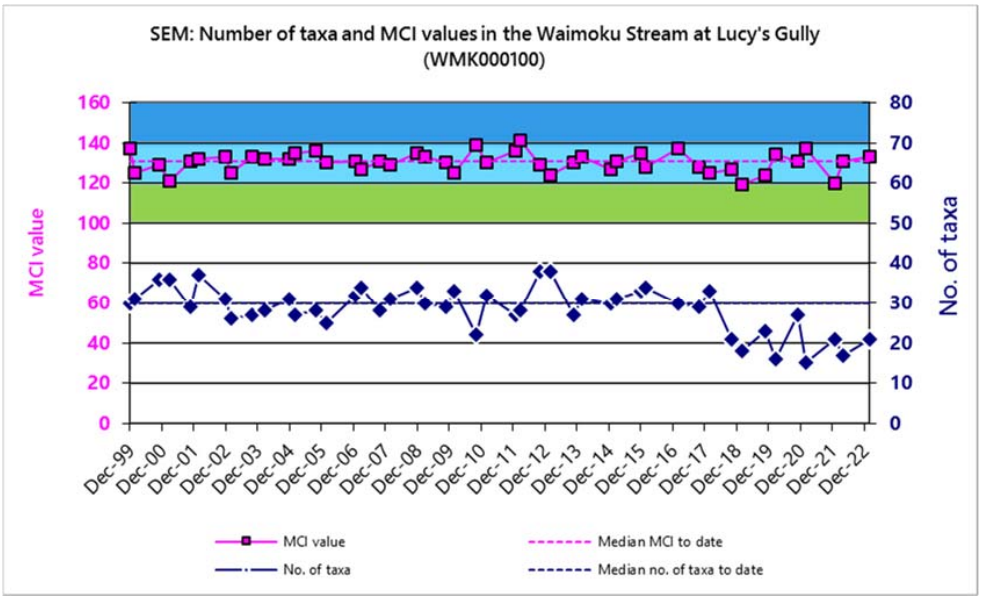

SEM: Number of taxa and MCI values in the Waiokura Stream at Manaia Golf Course (WKR000700)
MCI value
No. of taxa
120
100
80
60
40
20
0
80
70
60
50
40
30
20
10
0
Nov-07
Nov-08
Nov-09
Nov-10
Nov-11
Nov-12
Nov-13
Nov-14
Nov-15
Nov-16
Nov-17
Nov-18
Nov-19
Nov-20
Nov-21
Nov-22
MCI value
Median MCI to date
Taxa No
Median no. of taxa to date

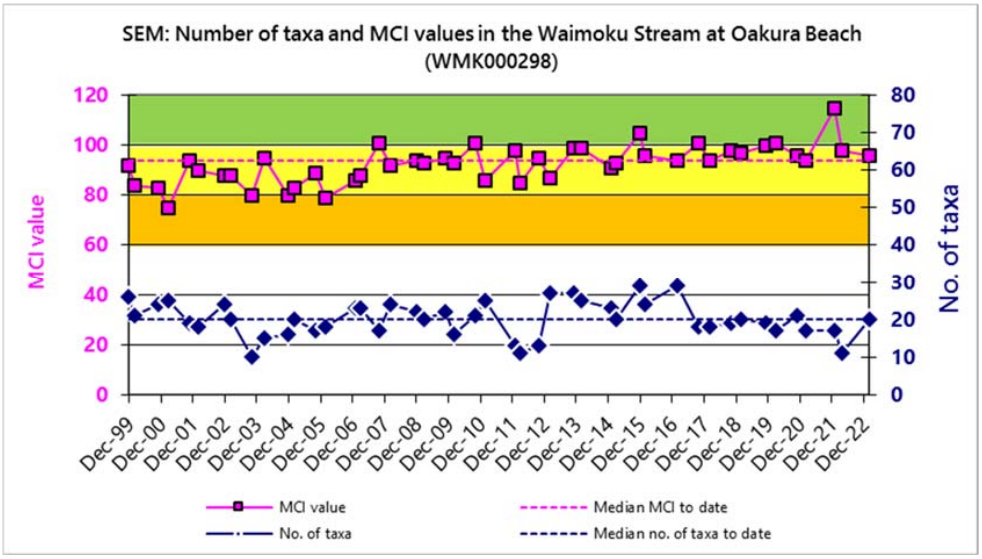
Waimōku

Taxa List	Site Code	Taranaki MCI Score	WMK000100	WMK000298
	Sample Number		TRC2310400	TRC2310401
Annelida (Worms)	Oligochaeta	1	-	C
Mollusca	*Potamopyrgus*	4	-	VA
Crustacea	Talitridae	5	C	-
	Paratya	3	-	R
	Paranephrops	5	R	-
Ephemeroptera (Mayflies)	*Austroclima*	7	A	A
	Coloburiscus	7	A	C
	Deleatidium	8	C	C
	Ichthybotus	8	R	-
	Nesameletus	9	C	-
	Zephlebia group	7	A	-
Plecoptera (Stoneflies)	*Austroperla*	9	C	-
	Zelandoperla	8	R	-
Coleoptera (Beetles)	Elmidae	6	R	C
	Hydrophilidae	5	R	-
	Ptilodactylidae	8	R	-
Megaloptera (Dobsonflies)	*Archichauliodes*	7	R	-
Trichoptera (Caddisflies)	*Costachorema*	7	-	R
	Hydrobiosis	5	R	R
	Hydrobiosella	9	C	-
	Neurochorema	6	-	R
	Hydropsyche (Orthopsyche)	9	A	R
	Oxyethira	2	-	R
	Pycnocentrodes	5	-	R
	Triplectides	5	-	R
Diptera (True Flies)	*Aphrophila*	5	R	C
	Eriopterini	5	R	R
	Hexatomini	5	R	-
	Maoridiamesa	3	-	C
	Orthocladiinae	2	-	VA
	Polypedilum	3	C	C
	Austrosimulium	3	-	C
		Number of Taxa	21	20
		Taranaki MCI	133	96
		Taranaki SQMCI	7.3	3.6
		EPT (taxa)	11	9
		% EPT (taxa)	52	45

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

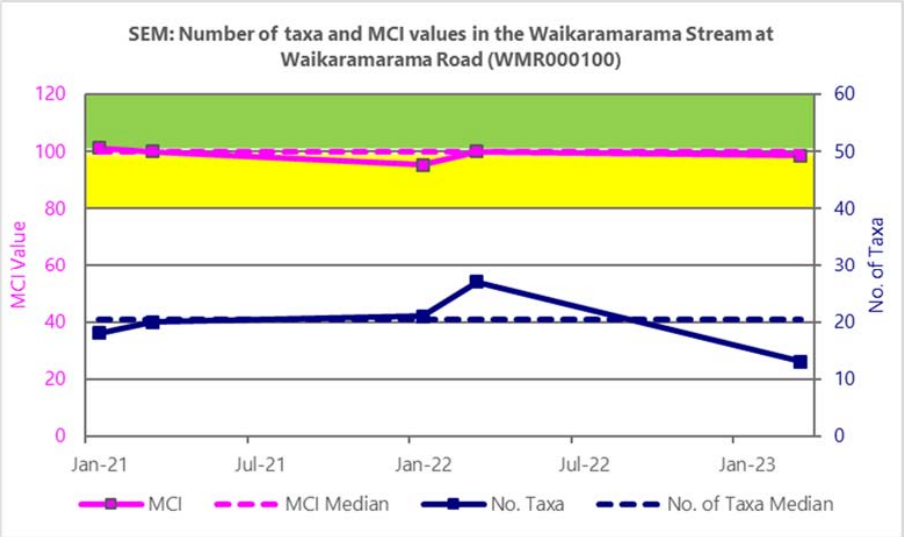
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Waimoku Stream at Lucy's Gully (WMK000100)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

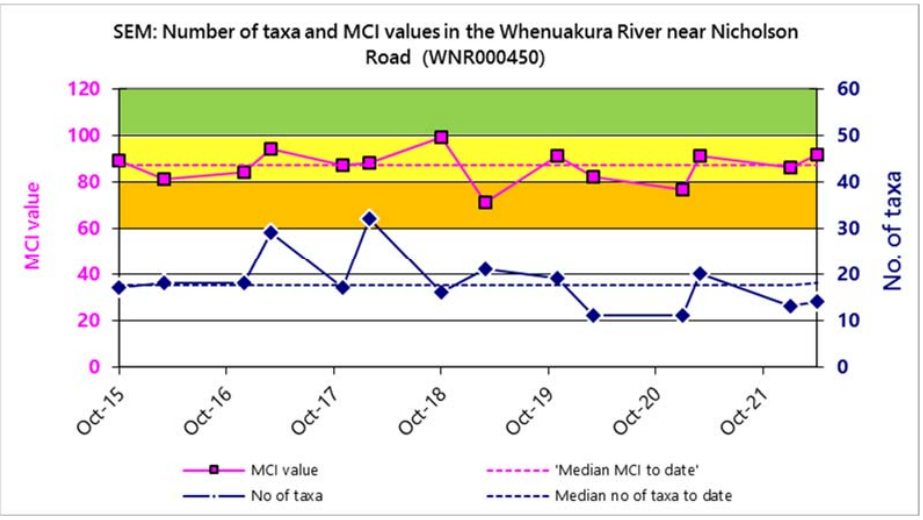

SEM: Number of taxa and MCI values in the Waimoku Stream at Oakura Beach (WMK000298)
MCI value
No. of taxa
MCI value
Median MCI to date
No. of taxa
Median no. of taxa to date

Waikaramarama

Taxa List	Site Code / Sample Number	Taranaki MCI Score	WMR000100 / TRC2310399
Annelida (Worms)	Oligochaeta	1	R
Mollusca	*Potamopyrgus*	4	A
Ephemeroptera (Mayflies)	*Austroclima*	7	VA
	Coloburiscus	7	C
	Deleatidium	8	A
	Zephlebia group	7	R
Coleoptera (Beetles)	Elmidae	6	A
Trichoptera (Caddisflies)	*Hydrobiosis*	5	C
	Psilochorema	6	R
Diptera (True Flies)	Eriopterini	5	R
	Orthocladiinae	2	A
	Polypedilum	3	R
	Austrosimulium	3	A
		Number of Taxa	13
		Taranaki MCI	98
		Taranaki SQMCI	5.8
		EPT (taxa)	6
		% EPT (taxa)	46
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa	
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant			



Whenuakura

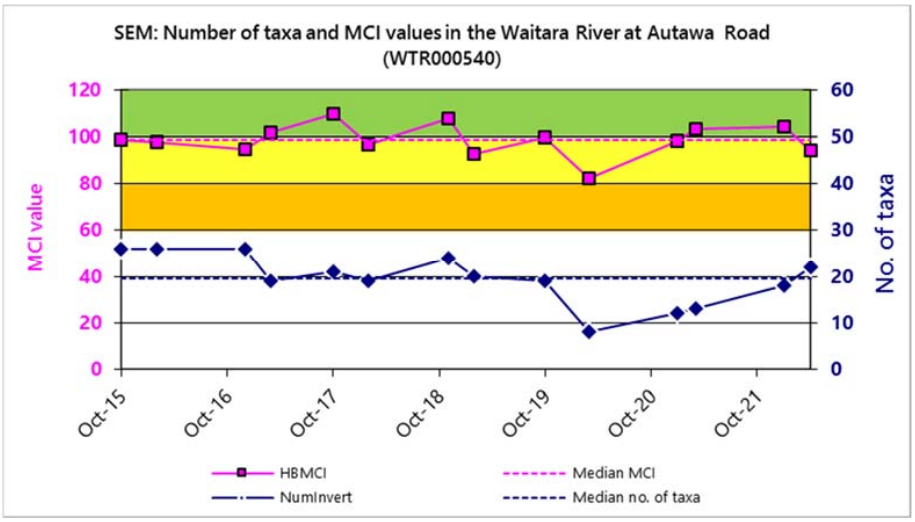

SEM: Number of taxa and MCI values in the Whenuakura River near Nicholson Road (WNR000450)
MCI value
No. of taxa
120
100
80
60
40
20
0
60
50
40
30
20
10
0
Oct-15
Oct-16
Oct-17
Oct-18
Oct-19
Oct-20
Oct-21
MCI value
'Median MCI to date'
No of taxa
Median no of taxa to date

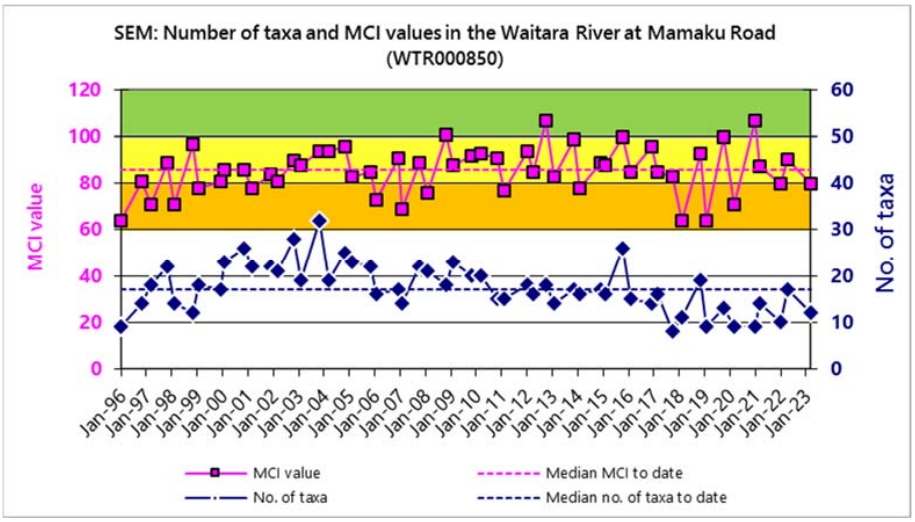
Waitara

Taxa List	Site Code / Sample Number	Taranaki MCI Score	WTR000850 / TRC2310992
Mollusca	*Potamopyrgus*	4	C
Crustacea	*Paratya*	3	R
Ephemeroptera (Mayflies)	*Austroclima*	7	R
Megaloptera (Dobsonflies)	*Archichauliodes*	7	R
Trichoptera (Caddisflies)	*Hydropsyche (Aoteapsyche)*	4	A
	Hydrobiosis	5	R
	Oxyethira	2	R
Diptera (True Flies)	*Aphrophila*	5	R
	Maoridiamesa	3	C
	Orthocladiinae	2	C
	Polypedilum	3	C
	Austrosimulium	3	R
		Number of Taxa	12
		Taranaki MCI	80
		Taranaki SQMCI	3.7
		EPT (taxa)	3
		% EPT (taxa)	25

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


SEM: Number of taxa and MCI values in the Waitara River at Autawa Road
(WTR000540)
MCI value
No. of taxa
120
100
80
60
40
20
0
60
50
40
30
20
10
0
Oct-15
Oct-16
Oct-17
Oct-18
Oct-19
Oct-20
Oct-21
HBMCI
NumInvert
Median MCI
Median no. of taxa


SEM: Number of taxa and MCI values in the Waitara River at Mamaku Road
(WTR000850)
MCI value
No. of taxa
120
100
80
60
40
20
0
60
50
40
30
20
10
0
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date

Date: 3 September 2024

Subject: **Submission on Proposed Temporary Fishing Closure in Western Taranaki**

Author: F Kiddle, Strategy Lead

Approved by: A D McLay, Director - Resource Management

Document: 3301137

Purpose

1. To seek endorsement of a submission supporting a request from Taranaki Iwi and Hapū for an extension of the 2-year fishing closure over western Taranaki.

Executive summary

2. Taranaki Iwi and Hapū are seeking an extension of the 2-year fishing closure over western Taranaki. The original closure was supported by the Council. It is recommended the Council support it again. A further two years will allow more time for the recovery of key species. Over the next two years, it will be important to prioritize further monitoring to inform future decision-making.

Recommendations

That Taranaki Regional Council:

a) receives the memorandum titled Submission on proposed temporary fishing closure in western Taranaki

b) endorses the submission contained in Appendix One

c) determines that this decision be recognised not significant in terms of section 76 of the Local Government Act 2002

d) determines that it has complied with the decision-making provisions of the Local Government Act 2002 to the extent necessary in relation to this decision; and in accordance with section 79 of the Act, determines that it does not require further information, further assessment of options or further analysis of costs and benefits, or advantages and disadvantages prior to making a decision on this matter.

Background

3. Taranaki Iwi and Hapū have requested a 2-year closure over an area in western Taranaki to the harvest of:
   - all shellfish, including crayfish
   - all seaweeds, excluding beach cast seaweed

- all anemones
- all stingrays
- conger eel species (Conger wilsoni and Conger verreauxi).

4. The application is an extension of the previous 2-year closure. Taranaki Iwi and Hapū consider that more time is needed for population recovery, for data collection over a sufficient time scale, and to establish longer-term protection strategies. While it was included in the original application, the previous closure did not include kōura (red crayfish). Taranaki Iwi and Hapū are again seeking this species to be subject to the closure. Their full application is contained in Appendix Two. A map of the closure is in Appendix Three.
5. In September 2022, the Taranaki Regional Council (Council) previously submitted in support of the original closure. This support was based on a shared concern amongst Council and Taranaki iwi and Hapū about the impact of recreational fishing on shellfish stocks along the Taranaki coast.
6. Submissions on the current application close on 30 September 2024.

Issues

7. The sought extension to the closure seeks to address the issue of over-fishing along the coast of western Taranaki.

Discussion

8. It is recommended Council again support the temporary closure application. Two years is not long-enough to see sufficient recovery in fish stocks. For example, pāua require at least three years to reach sexual maturity and koura even longer. The application highlights there are initial signs of recovery. However more than two years is needed to develop a meaningful data set to determine if populations are sufficiently recovered.
9. To support future decision-making, there is a need for ongoing monitoring as part of any closure extension. Taranaki iwi and Hapū has undertaken a range of monitoring activities. However, further collaboration between Fisheries New Zealand, Taranaki Iwi and Hapū, and Council is encouraged. This will help to support the development of longer-term solutions for protecting taonga species.

Options

10. The Committee can endorse the submission, endorse the submission subject to amendments directed by the Committee, or not endorse the submission. Considering the proposed approach will help ensure the recovery of important species and aligns with the Council's previous decision, endorsement is recommended.

Significance

11. This decision is assessed as not significant with regards to the Significance and Engagement Policy. The decision aligns with previous Council decisions and the final decision making power rests with the Government.

Financial considerations—LTP/Annual Plan

12. This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

13. This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Local Government Official Information and Meetings Act 1987.

Iwi considerations

14. This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the Local Government Act 2002) as outlined in the adopted Long-Term Plan and/or Annual Plan. Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum.
15. Support for the closure aligns with the goals of Taranaki Iwi and Hapū. It also supports their exercise of kaitiakitanga over their taonga.

Community considerations

16. This memorandum and the associated recommendations have considered the views of the community, interested and affected parties and those views have been recognised in the preparation of this memorandum.
17. As noted in the application, 92% of submitters supported the original closure application.

Climate Change Considerations

18. Climate change will almost certainly add increasing strain on coastal ecosystems. For example increased marine heatwaves can cause coral bleaching, harmful algal blooms, kelp and seagrass dieback, disease and mortality in invertebrates, and location shifts in fish species. Ocean acidification also makes it harder for some marine organisms to form shells and skeletons.
19. The proposed closure will support the resilience of affected species to the above effects. It will do this by helping address overexploitation, thereby reducing an additional source of stress on populations.

Legal considerations

20. This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices/Attachments

Document 3301083: Submission on proposed temporary fisheries closure in western Taranaki

Document 3301369: Taranaki Iwi and Hapū closure application 2024

Document 3301382: Map of the proposed western Taranaki temporary closure

3 September 2024

Document: 3301083

Fisheries Management – Spatial Allocations
Fisheries New Zealand
PO Box 2526
Wellington 6140

Via email: FMSubmissions@mpi.govt.nz

Proposed temporary fisheries closure in western Taranaki

The Taranaki Regional Council (Council) welcomes the opportunity to provide feedback on the application by Taranaki Iwi and Hapū for a two year fishing closure on the Taranaki coast.

Council supports the application for an extension to the existing closure based on the following principles put forward by Taranaki Iwi and Hapū:

1. the extension will provide more time for the affected taonga species to continue in their recovery;
2. the extension will provide more time for monitoring and data collection to support informed decision making regarding future management of the fishery; and
3. the extension will provide more time to develop and propose a longer term strategy for sustainable fisheries management in western Taranaki.

As mentioned in our previous submission, we reiterate the importance of monitoring these key species to support informed decision making. We would like to encourage further collaboration and support between Taranaki Iwi and Hapū, Fisheries New Zealand, and the Council. Going forward, there is an opportunity to collaboratively build on the monitoring work being undertaken by Taranaki Iwi to inform the development of longer-term, sustainable management solutions.

The Council looks forward to working with all parties in supporting the health of the Taranaki coastal environment.

Yours sincerely,

Steve Ruru
Chief Executive

47 Cloten Road, Private Bag 713, Stratford 4352, New Zealand | 06 765 7127 0800 736 222 | info@trc.govt.nz www.trc.govt.nz

Taranaki Iwi
me tōngai hārakeke

Level 4/139 Devon Street West, New Plymouth | P O Box 929, Taranaki Mail Centre | NEW PLYMOUTH 4310
Tel: (+64) 6 751 4285 | E-mail: admin@taranaki.iwi.nz
www.taranaki.iwi.nz

31 July 2024

Minister for Oceans and Fisheries
Ministry of Primary Industries
Charles Fergusson Building
38-42 Bowen St
Pipitea
PO Box 2526
WELLINGTON 6140

SENT VIA EMAIL & COURIER

Attention: Minister Shane Jones

Tēnā koe e te Minita,

Poua ki runga
Poua ki raro
Poua ki tāmoremore nui nō papa ki tāmoremore nui nō rangi
E rongo he aio, tēnā tawhito pou ka tū
E kore e uea
E kore unuhia
E kore hinga
E kore wharara
Tēnei to pou ka tū, e hai!

RE: REQUEST FOR A TWO-YEAR EXTENSION OF THE WESTERN TARANAKI TEMPORARY CLOSURE UNDER s186a OF THE FISHERIES ACT

On behalf of Taranaki Iwi and Hapu, we write to formally request and apply for a two-year extension of the current Western Taranaki Temporary Closure under Section 186a of the Fisheries Act 1996, until December 2026. The rationale for this request/application is set out in this letter.

1. **Applicants: Taranaki Iwi and Hapū via:**
   - Chairperson / Jacqui King of Te Kahui o Taranaki Trust (Post Settlement Governance Entity for Taranaki Iwi)
   - Level 4/139 Devon Street West, New Plymouth
   - PO Box 929, Taranaki Mail Centre, New Plymouth 4310
   - [redacted]

2. **Location of requested extension and map of area involved:**
   2.1. See Appendix 1.

Taranaki Iwi
me tōngai harakeke

3. Temporary Closure Process

3.1. This is a request for an extension of the current Western Taranaki Temporary Fisheries Closure under section 186a of the Fisheries Act 1996 (see 5.6 – Step 6 below).

4. Kai Mātaitai Species

4.1. Kai Mātaitai species included in the current section 186a Temporary Closure and requested to be included in the extension are seen in Appendix 2.

4.2. Please note this includes the addition of Kōura (Red Crayfish) which was part of the original temporary closure request.

5. Steps taken in the protection of Kai Mātaitai within the rohe of Taranaki Iwi

5.1. Step 1 - 2020 -21 Observation of excessive exploitation of Kai Mātaitai by increasingly organised groups, frequently from outside the local area.

5.2. Step 2 – Attempts to educate Kai Mātaitai collectors by Iwi, Hapu and Community volunteers.

5.3. Step 3 - Early 2022 a traditional Rahui was placed on the Western Taranaki inshore Kōhanga by Taranaki Iwi and all nga Hapū o Taranaki Iwi, with the support and many of the wider community.

5.4. Step 4 – 2022 Public meetings and consultation with Hapū resulted in an application for a temporary closure of the fishery under section 186a of the Fisheries Act 1996.

5.5. Step 5 – December 2022 the section 186a Application was approved by the Minister of Oceans and Fisheries as requested, excluding Kōura (Red Crayfish) and Gazetted. This temporary closure has been in force since, providing legal protection of the Kai Mātaitai.

5.6. Step 6 – (Now):

5.6.1. Taranaki Iwi and Hapu respectfully request an extension of the section 186a Temporary Closure as initial evidence is clear from our marine survey data to date that there is evidence of potential future growth but an insufficient current stock for sustainable harvesting.

5.6.2. Lifting the section 186a temporary closure poses significant risks to the marine environment's health, as the Kai Mātaitai population is not yet stable enough to support sustainable harvesting, potentially leading to over-harvesting and long-term damage.

5.6.3. Evidence shows more time is needed to prevent the total collapse of the toanga species and to allow for the implementation of protocols which will allow for sustainable collecting for future generations. On advice from the highest level we are requesting a two-year extension.

Taranaki Iwi
me tōngai harakeke

6. Extension of the section 186a Temporary Closure

6.1. Te Kāhui o Taranaki Trust agreed a deed of settlement with the Crown on September 2016 which recognise that Taranaki Iwi are Tangata Whenua. As part of the agreed settlement, the Ministry of Primary Industries issued a protocol recognising and supporting the right of Taranaki Iwi to manage their customary fisheries according to their customs and traditional practices. Since December 2022 the traditional Rahui has been supported by a section 186a Temporary Closure.

6.2. During this time local Hapū have voluntarily ceded their rights under the law to harvest for culturally significant occasions. Compliance to the closure by the wider community has been very strong. This is in line with the very high levels of support shown in submissions on the 2022 closure with 92% of submitters in favour.

6.3. Taranaki Iwi and Hapu now request that the success of this closure be continued to allow for the regeneration process to reach sustainable levels. The inshore kohanga zone is at a critical juncture and action is vital with respect to future sustainability by continued short term closure and the development of longer-term protection measures and protocols.

7. Consultation / Engagement

7.1. This has been wide and detailed. The consultation process has been guided by the Rahui Takutai Steering Group (a collective of Marae/Pa, Hapu and Community leaders) with the support of Taranaki Iwi. Co-design, unity and collaboration has developed as tikanga for this group, with Kotahitanga me te Mahitahi becoming a key value.

7.2. To this end Hapū have been frequently consulted and engaged by the Hapu Representatives who are part of the Rahui Takutai Steering Group. Each Marae/Pa/Hapu have held hui to determine the best way forward in terms of the current protection measures. In addition, Taranaki Iwi have provided regular updates and wānanga, such as at their AGM in October 2023 and with Marae/Pa/Hapu leaders at Parihaka in July 2024. Each Marae/Pa/Hapu within Taranaki Iwi support this extension request.

7.3. This follows an already common practice of engaging with the community, a range of which have been held to date, including at Oaonui Hall on 5 February 2023, Oakura Hall on 28 August 2022 and Opunake Events Centre on 29 April 2023. As well as hui held with the Cape Egmont Boat Club and Opunake Boat Club.

7.4. During the 2022 public submissions a wide variety of organisations, groups and individuals responded with 92% were in favour of closing the fishery.

7.5. In March 2023, Te Kahui o Taranaki established and employed, a Takutai Kaitiaki Team. This team is working closely with the Taranaki Regional Council with monitoring, surveying and providing education in schools.

7.6. Local organisations have been continually communicated with - as an example, see Appendix 3 Letter from Opunake Boat Club.

Taranaki Iwi
me tōngai harakeke

7.7. This consultation and the mahi undertaken to protect the Takutai has led to two major community awards. The Taranaki Regional Council's Environmental Award and the Taranaki Daily News Person of the Year Award. The latter was accepted only on the grounds it was presented to the entire Rahui Takutai Steering Group which is the first time this award was issued to a group rather than an individual.

7.8. A major result of these consultation processes and the public recognition of this kaupapa has been the raising of awareness and understanding of the Mataitai and the whole concept of rahui from a Te Ao Maori perspective.

8. Reasons for application for extension

8.1. The state of taonga species that remain within the inshore Kohanga (traditional breeding ground) in the Western Taranaki Closure rohe is at a critical point. This closure extension will enable the Mātaitai to recover, increase in size and abundance as populations show initial signs of recovery. Extended time is particularly relevant to Paua, which require at least 3 years to reach sexual maturity and Koura which take even longer as is the case with many other threatened species.

8.2. The current ban and associated monitoring has only a short time series, resulting in limited temporal data, which does not allow robust conclusions of the time necessary for the full recovery of the fisheries. Methods of quantitative intertidal reef surveys using 1m2 quadrants at 15m intervals as well as semi quantitative surveys assessing species zonation at high tide, mid and low tide have been used to survey Paua, Kina, Kutai, Pupu and other Mātaitai. Initial results show the juvenility of the Mataitai is such that harvesting could permanently damage the resource. Further time is required to continue data collection on a sufficient time scale to allow adequate assessment of recovery. The unbridled exploitation of the past cannot be rebalanced and regenerated in 24 months.

8.3. Previous unrestricted public pillaging of any and every species of shellfish, plant, anemone and fish occurred in the period leading up to the closure. Every thing living was taken. Monitoring by Volunteers reported piano wires, wire, shovels, spades, crowbars and sharp hand tools as methods used to strip the reefs (Pukawa) bare.

8.4. In March 2023 Te Kāhui o Taranaki Iwi employed a Takutai Kaitiaki team to carry out:

- Paua time counts on multiple Pukawa (abundance and size)
- Surveys for other Mātaitai species, including Kina, Pupu and other Mātaitai
- Intertidal Pukawa surveys
- Monitoring of poachers including direct observations of illegal harvesting on the Pukawa, the number of rocks turned the wrong way and promotion and direct reports to the MPI 0800 Poacher hotline.
- In addition, the Takutai Team have been working with local schools and the Taranaki Regional Council to increase education around the Rahui and better understand the response of the rocky shore communities. (E.g. Turning rocks back the right way)

Taranaki Iwi
me tōngai harakeke

8.5. Continued support under the law is imperative to prevent the total collapse of the Taonga Species and the erosion of the ecosystem. Paua require at least 3 years to reach sexual maturity.

8.6. A recent example of the premature lifting of a closed fishery is the Kaikoura event in 2022. Research conducted since the 2016 earthquakes had shown that in response to the five year fishery closure, paua abundance recovered significantly in many parts of the coastline. The large recreational catch taken during the initial reopening, during the 2021/22 season was attributed to fishing occurring over the peak summer period (December to February) when visitor numbers into the region were highest and an initial very high abundance of easily accessible paua in shallow wade-able areas close to shore with car parking availability. This had a devasting impact on the fishery. Owing to the accessibility of many Mataitai Pukawa (reefs) located at road ends within the Taranaki Iwi Rohe, we strongly believe that if the temporary closure is not extended, over harvesting of Mataitai species, which are in a in the midst of trying to recover, is inevitable.

8.7. Previous over harvesting has resulted in significant damage to intertidal Pukawa ecosystems in addition to targeted Mātaitai species.

8.8. An extension of the current section 186a closure will provide the time necessary for the establishment of longer term protection strategies (such as Mataitai Reserves or other considerations) with appropriately agreed mechanisms to provide managed protection to all threatened species and the ecosystem. These protections are essential to ensure an environment of future sustainability and ecological balance. This is in line with the Fisheries Act 1996 which requires the implementation of management practices that will ensure future gathering is sustainable and Pukawa ecosystems are adequately protected in line with Section 8 (1) and 9 of the Fisheries Act 1996.

8.9. The purpose of the Fisheries Act 1996 is to provide for the utilisation of fisheries resources while ensuring sustainability. In the Act, ensuring sustainability means *"maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations".*

8.10. Section 9 c of the Act requires the following Environmental Principles: *"biological diversity of the aquatic environment should be maintained"* and *"habitat of particular significance for fisheries management should be protected".*

8.11. The requested closure extension would meet the requirements under section 186a (2) of the Act which is *"to recognise and make provision for the use and management practices of Tangata whenua in the exercise of noncommercial fishing rights"* by improving the availability and size of Mātaitai.

8.12. The Customary Fishing Act 1998 goes further in managing Mataitai resources with the allowing of Mataitai Reserves to be established and Customary Management practices to be applied within the protocols laid out. The implementation of these practices and customary approaches will be paramount for building a sustainable resilient ecosystem within our Pukawa for the future. We are currently in the process of canvassing the range of options, our current

Taranaki Iwi
me tōngai harakeke

preference for a Mataitai Reserve with our whanau. This protection measure, alongside other options will be detailed and once a decision is made by our community on the preferred protection measures, an application will be made on that matter. However, what is clear is the overwhelming support for the following:

"He matenga poto, he oranga roa"
(A short term sacrifice, for long term benefits."

9. Anticipated benefits of an extension

9.1. The realisation of inter-relationships of all phenomena, physical and spiritual and the interdependence amongst all natural phenomena and our place within it. This is an understanding of Te Ao Maori world view and is being shared widely with our community.

9.2. These benefits will be not only be local (hapū), regional (Iwi) but also nationwide. Not only short term but also long term.

9.3. The understanding of traditional methods of sustainability (eg Rahui), by the wider community.

9.4. The systems of sustainable harvesting, times, numbers and priorities are developed, and longer term protection measures given time to be put in place.

9.5. Knowledge of taonga species and understanding of protection processes are widely understood.

9.6. Pride in protection of taonga species and our ecosystems.

9.7. Wider community relationships are enhanced.

10. We formally request:

10.1. That the Minister of Oceans and Fisheries approve an extension to the Western Taranaki section 186a Temporary Closure for a two-year period from 15 December 2024 to 15 December 2026, for Taranaki Iwi, Hapu and the wider Community.

10.2. The extension will provide an opportunity for more scientific research, taonga species to continue in their recovery, grow in size and numbers to restore the mauri of the West Taranaki inshore Kōhanga and to allow time to establish a set of long term protection measures and protocols (e.g. Mataitai reserves or alternatives). The concept of mahi tahi and the collective inclusive approach involving Whanau, Hapu, Marae, Stakeholders and the wider community will take New Zealand forward to a more sustainable and balanced environmental future.

11. Executive Summary.

11.1. Taranaki Iwi, Hapu, and the wider Community request an extension for two-years of the Western Taranaki 186a Closure.

Taranaki Iwi
me tōngai Harakeke

11.2. The current perilous state of Taonga Mātaitai species within the two nautical miles of closed area cannot be overstated.

11.3. The need for more time to establish robust scientific data and the opportunity to develop longer term protection is critical to allowing a sustainable resource for future generations. It is this focus that are the key drivers of our request.

Ngā mihi,

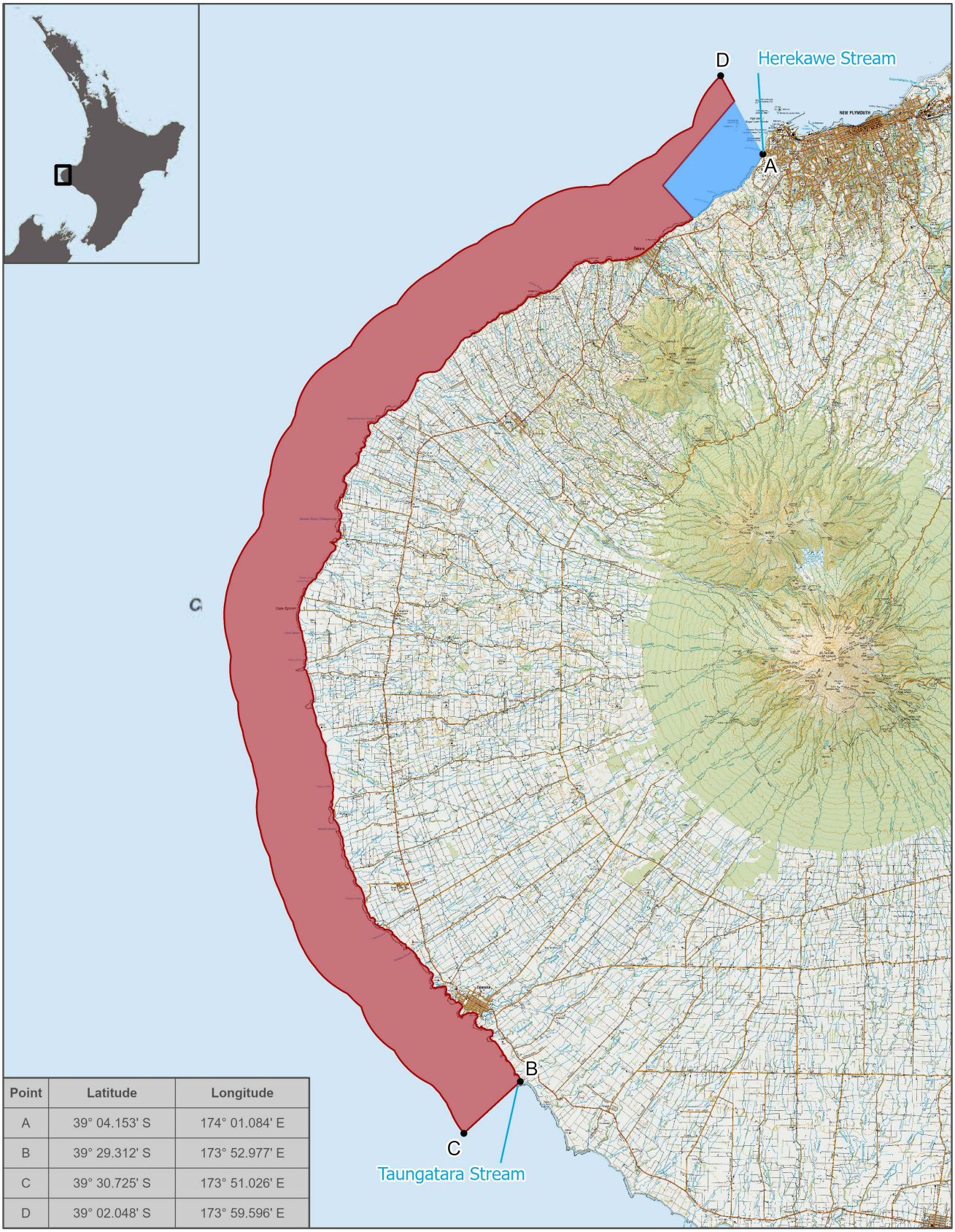
[redacted]

Hon. Mahara Okeroa
For and behalf of ngā Hapū o Taranaki Iwi

[redacted]

Jacqui King
Chair of Te Kāhui o Taranaki Trust

Fisheries New Zealand
Tini a Tangaroa



Point	Latitude	Longitude
A	39° 04.153' S	174° 01.084' E
B	39° 29.312' S	173° 52.977' E
C	39° 30.725' S	173° 51.026' E
D	39° 02.048' S	173° 59.596' E

Proposed Temporary Closure for Western Taranaki

Proposed s186A Temporary Closure Coordinates
Proposed s186A Temporary Closure Area
Tapuae Marine Reserve

Proposed s186A Temporary Closure excludes those New Zealand fisheries waters in the Tapuae Marine Reserve defined in the Marine Reserve (Tapuae) Order 2008.

0 1 2 nm
0 3.5 7 km

N

Map Scale: 1:250,000

Date: 18/07/2024
Produced by: Spatial Intelligence
Reference: r220090
Coordinate System: NZGD 2000 New Zealand Transverse Mercator

Data Attribution:
This map uses data sourced from LINZ under CC-BY.

Date: 3 September 2024

Subject: **Climate change mitigation submissions**

Author: F Kiddle, Strategy Lead

Approved by: A D McLay, Director - Resource Management

Document: 3300250

Purpose

1. To seek endorsement of a submission from the Taranaki Regional Council (Council) on the Government's proposals for a regulatory regime for carbon capture, utilisation and storage; and inform Council of a submission from the Taranaki Mayoral Forum on the discussion document for New Zealand's second emission reduction plan.

Executive summary

2. The Government has consulted on two significant pieces of work regarding climate change mitigation. The first is a set of proposals to develop a regulatory regime for carbon capture, utilisation and storage (CCUS). The Government's preferred option is to integrate CCUS activities in to the New Zealand Emissions Trading Scheme (NZ ETS) and develop a regulatory regime to manage liability and ensure storage sites are appropriately monitored.
3. The second piece of work is a discussion document on New Zealand's second emission reduction plan. This plan will set out the actions New Zealand will take from 2026-2030 to reach our climate targets. The discussion document outlines a range of actions across the transport, energy, agricultural, forestry and waste sectors. This also includes the Government's approach to the NZ ETS. The high-level approach proposed by the Government is one that focuses on taking a "least-cost" and "net-based" approach.
4. Due to the consultation closing on 6 August, a draft submission on the CCUS proposals was circulated to the Policy and Planning Committee out of session via email for comment. The submission noted that CCUS could be an important tool, but that it must not be used as an excuse to not pursue other mitigation activities, including behavior change. It also highlighted the importance of NZ ETS integration and of not duplicating regulatory requirements under existing legislation.
5. Considering its broad nature and wide-ranging implications for Taranaki, the Taranaki Mayoral Forum submitted on the second emission reduction plan. The submission expressed concern that New Zealand was not on-track to meet its emissions targets. It also expressed disappointment that a range of initiatives focused on supporting Taranaki to transition to a low-emissions economy have been stopped. The submission then stepped into the sector specific proposals. While there was plenty to be supported, there is plenty of need to do more, and the submission called for this.

Recommendations

That Taranaki Regional Council:

a) receives the memorandum titled Climate change mitigation submissions
b) endorses the submission in Attachment One on the Government's proposals for a regulatory regime for carbon capture, utilisation and storage
c) notes the contents of the Taranaki Mayoral Forum submission in Attachment Three on the discussion document for New Zealand's second emission reduction plan
d) determines that this decision be recognised as not significant in terms of section 76 of the Local Government Act 2002
e) determines that it has complied with the decision-making provisions of the Local Government Act 2002 to the extent necessary in relation to this decision; and in accordance with section 79 of the Act, determines that it does not require further information, further assessment of options or further analysis of costs and benefits, or advantages and disadvantages prior to making a decision on this matter.

Background

6. The Government has released two key documents for consultation relevant to climate change mitigation activities. The first is a discussion document on a proposed regulatory regime for carbon capture, utilisation and storage (CCUS). The second is a consultation document to inform the development of New Zealand's second emission reduction plan for 2026 to 2030.

Carbon capture, utilisation and storage

7. Carbon capture refers to technologies that remove carbon dioxide from the atmosphere in two ways. The first is point source carbon dioxide removal. These technologies apply at the source of emission, such as a smokestack at an oil and gas facility, and remove the carbon dioxide before it is emitted to the atmosphere. The other is direct air capture, which involves removing carbon dioxide directly from the air. Direct air capture technology is still nascent and expensive. Point source removal technology is more technologically advanced but still often encounters cost issues. The International Energy Agency notes that point source capture deployment has trailed behind expectations, but that momentum has grown substantially in recent years. They note that direct air capture needs the further development of market mechanisms and more policy support if it is to be a viable investment.
8. Regardless of how the carbon is captured, something needs to be done with it. Storage involves injecting the carbon dioxide gas into sub-surface geological formations. Former gas reservoirs often make good candidates as they have successfully stored natural gas for long periods. Utilisation requires converting the carbon dioxide into a usable product. For example, the Todd Kapuni Gas Treatment Plant already produces liquid carbon dioxide for the beverage, food processing and refrigeration markets.
9. New Zealand currently has no specific regulatory regime for managing CCUS and it is not integrated into the New Zealand Emissions Trading Scheme (NZ ETS). The Government is seeking to address this, with the full discussion document in Attachment Two. Key issues and the Government's preferred options are outlined in the below table:

Issues	Preferred Option
The NZ ETS does not currently recognise (and therefore reward) emissions reductions or removals from carbon capture and storage (CCS) beyond forestry.	NZ ETS participants carrying out storage activities are able to subtract emission captured and stored from its own activity through CCS for the purposes of estimating its ETS liability. Business deploying storage technologies could also choose to capture carbon dioxide and received New Zealand emissions units for their removals (similar to forestry).
There are currently no monitoring requirements for CCS. It is particularly important to monitor to make sure stored carbon dioxide does not leak out.	Require CCUS operators to monitor storage sites and collect the following information: CO_2 captured, CO_2 leakage during transportation and injection, CO_2 sequestered in a storage site, and migration and leakage of CO_2 from a storage site.
There is no regulatory regime designed specifically for establishing liability for CO_2 storage sites.	Operators who are responsible for CO_2 storage sites would be required to: 1. apply for permits for activities relating to exploring and injecting CO2 into storage sites 2. submit and gain approval for their plans to monitor stored carbon 3. monitor leakage and migration of CO2, environmental impacts, and the safety and integrity of the storage site 4. in the event of leakages of CO2 or significant irregularities, notify the government and pay appropriate compensation 5. before the closure of a CO2 storage site, record and report information on the site closure plans, closure cost estimates, a closure completion report, and evidence demonstrating that the sites can technically be used for CO2 storage and will have no or negligible risk of leakage 6. complete a financial capability assessment if requested, to determine the operator's ability to meet the costs of maintaining or remediating the site.

10. The Government also wants feedback on the consenting and permitting process for CCUS, including under the Resource Management Act 1991 (RMA). It considers the current settings are broadly neutral.
11. Submissions closed on 6 August 2024.

Second emissions reduction plan

12. Emissions reduction plans outline the actions the Government will take to reduce greenhouse gas emissions over different periods. The second emissions reduction plan covers 2026 to 2030. The current targets these plan work towards are that by 2050 greenhouse gasses, except for methane, are at net zero, and biogenic methane emissions are 24-47% below 2017 levels. The methane targets are currently under review by an independent panel.
13. Based on the policies set out in the discussion document, New Zealand is no longer on track to meet the 2050 net zero target, and is still not on track to meet the methane target. While the removal of some policies plays a role in this change regarding net zero, changes in modeling and that the Tiwai Point aluminum smelter will remain open for at least two more decades have also had an impact.

14. The Government is proposing to take a 'least-cost' and 'net-based' strategy to mitigation. Least-cost refers to removing "barriers to enable rapid investment in a climate response that also grows our economy and increased productivity". Net-based refers to meeting "our targets by a mixture of actions that reduce our overall emissions, alongside activities that remove greenhouse gasses from the atmosphere."
15. The document sets out key actions across a range of areas. These are summarized in the below table.

Area	**Actions**
Energy	• Enabling accelerated investment in renewable energy generation and electricity networks by improving the resource management system. • Enabling carbon capture technology. • Doubling renewable energy by 2050. • Delivering a smarter electricity system that gives New Zealanders the ability to change how and when they use power.
Transport	• Working with Sustainable Aviation Aotearoa, which is a group of private sector and government agencies supporting the decarbonisation of the aviation sector. • Enabling a network of 10,000 public electric vehicle chargers by 2030, subject to a cost-benefit analysis. • Reviewing regulatory barriers to zero-emissions heavy vehicle uptake. • Working with other countries on sustainable aviation fuels and low- and zero-carbon shipping on key trade routes by 2035. • Supporting public transport in key areas.
Agriculture	• Reviewing methane science and target. • Accelerating the development of tools and technologies to reduce on-farm emissions. • Developing on-farm emissions measurement for implementation by 2025. • Recognising more on-farm activities that remove greenhouse gases from the atmosphere. • Implementing a fair and sustainable pricing system for agricultural emissions by 2030. • Accelerating the development and commercialisation of emissions-reduction tools and technologies.
Forestry and wood processing	• Restoring confidence and credibility in the New Zealand Emissions Trading Scheme to give certainty to the market. • Managing on-farm conversions to forestry through the New Zealand Emissions Trading Scheme. • Boosting wood processing by improving the consenting framework, supporting commercial investments, and getting the system settings right to be building with wood.
Waste	• Incentivising efficient landfill gas capture through the New Zealand Emissions Trading Scheme. • Investing a portion of the waste disposal levy into New Zealand's waste infrastructure. • Targeting further investment in New Zealand's resource recovery infrastructure and systems (including construction and demolition waste).

	• Investigating improvements to organic waste disposal and landfill gas capture.

16. The full discussion document also sets out all the mitigation initiatives that have been stopped. Key ones for Taranaki include developing an equitable transition strategy, supporting regions and industries to manage the transition, implementing the Just Transition Partnership Programme, and managing the phase-out of fossil gas including developing a gas transition plan.

Issues

17. Both discussion documents have significant impacts on Taranaki. Successful climate change mitigation is the most impactful thing to reduce the impacts of climate change on Taranaki communities. Between the agricultural, forestry and oil and gas industries, the Government's mitigation activities will also have a large impact on most of the region's economy.

Discussion

18. A draft submission on the CCUS proposals was circulated to the Policy and Planning Committee out of session for comment on 26 July 2024. The submission:
    - Indicated that CCUS could be a key tool, among others, to support climate change mitigation. However, it must not be used as an excuse not prioritise wider mitigation activities and the shift to less carbon intensive lifestyles.
    - Emphasised the importance of utilising existing regulatory systems, such as the RMA and the Crown Minerals Act 1991 as much as possible to avoid imposing unnecessary costs. In this, it was noted that the injection and storage of gas and liquid underground has been successfully managed in Taranaki for many years.
    - Despite the above, stated there are regulatory gaps around the allocation of sites and the management of liability that need addressing. Support was given to the proposed liability system outlined in the discussion document, as long as an applicant is subject to a through financial fitness test. Any liability regime will also need to avoid duplication with monitoring under the RMA.
    - Emphasised that CCUS needs to be well integrated into the NZ ETS if it is to be economically viable.
19. Upon feedback from the Committee, an additional point was added to the submission emphasizing that direct air capture technology in particular remains nascent and its ability to support emissions reduction uncertain. It was then submitted on 5 August 2024.
20. The Taranaki Mayoral Forum submitted on the second emission reduction plan discussion document. A submission from the Mayoral Forum was undertaken due to the high-level nature of the consultation and significance for Taranaki as a whole. The submission was developed collaboratively between the four councils, with input from Venture Taranaki. Efforts were taken to align messages with previous submissions, including a previous consultations on a range of energy topics, the now stopped NZ ETS review, and biodiversity credits.
21. Key points in the submission are:
    - The Mayoral Forum is very concerned the country is not on track to meet its emissions targets and considers stronger action is needed.
    - A least-cost approach is good, but it is doubtful that only focusing on net reductions will deliver this over the medium- to long-term.
    - The Forum is disappointed that a range of initiatives focused at supporting Taranaki to transition to a low-emissions economy have been stopped.

- Further work on developing regulatory pathways for low emission industries, such as offshore wind or hydrogen, is welcome. Going further, the submission calls on the Government to support the vision of Taranaki being a centre of renewable technology excellence for New Zealand.
- Support for restricting whole-farm conversion on highly productive land. However these rules need to be carefully developed to avoid unintended consequences and provide for regional flexibility.
- More work is required to incentivize native reforestation, with biodiversity credits being a potentially useful tool. Other sequestration options, such as blue carbon and wetland sequestration, also need to be investigated more.
- A focus on giving agricultural producers the tools and technologies they need to reduce emissions is welcome. Support for diversification is also needed.
- The Government is commended for allowing voluntary targeted rates schemes to commence again. These can help communities be more energy efficient and reduce their dependence on natural gas if they so choose. However there is a need for further support to households to transition to alternative energy sources.
- Public transport is not just for the big cities. It is important for the regions too.
- Further work to improve organic waste disposal and landfill gas capture is welcome. This should also include reviewing the compliance tools councils have to support organic waste collection, waste reduction and waste diversion.

22. Both of the consultations were very high-level, with substantive detail still to follow. Council officers will continue to monitor how the policy specifics develop. Further submissions will almost certainly be required and will be brought back for consideration in the future.

Options

23. The options regarding the CCUS submission are:
    a. Endorse the submission as submitted.
    b. Endorse the submission subject to officers preparing an amended submission based on Committee feedback and submitting this.
    c. Not endorse the submission and direct officers to request the withdrawal of the submission.
24. With the draft submission having been circulated to committee members out of session for comment, option a is recommended. Option b is workable but there are no guarantees the additional comments would be accepted. Option c is not recommended. CCUS technology is highly relevant to the Taranaki economy and accordingly Council should be involved in development of any regulatory regime.

Significance

25. Officials have assessed that the decision to endorse the submission as not significant under the Significance and Engagement Policy. Council is considering whether to approve lodgment of a submission. Decision-making as to whether to accept the submission will rest with the Government.

Financial considerations—LTP/Annual Plan

26. This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

27. This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Local Government Official Information and Meetings Act 1987.

Iwi considerations

28. This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the Local Government Act 2002) as outlined in the adopted Long-Term Plan and/or Annual Plan. Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum.

Community considerations

29. This memorandum and the associated recommendations have considered the views of the community, interested and affected parties and those views have been recognised in the preparation of this memorandum.

Climate Change Considerations

30. Carbon capture, utilisation and storage (CCUS) technology may offer a pathway for helping reduce emissions, thereby supporting climate change mitigation. The submission appropriately notes however that care is needed to ensure that a wide range of mitigation approaches are undertaken. This is to address concerns that CCUS technology may be counterproductive to mitigation due to the risk it perpetuates unsustainable behaviours.

Legal considerations

31. This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices/Attachments

Document 3293097: Submission on proposed regulatory regime for carbon capture, utilisation and storage

Document 3300252: Proposals for a regulatory regime for carbon capture utilisation and storage

Document 3301629: Signed Taranaki Mayoral Forum submission on second emissions reduction plan discussion document

Document 3300251: New Zealand's second emissions reduction plan consultation at a glance

6 August 2024

Document: #3293097

CCUS Team
Ministry of Business, Innovation and Employment
PO Box 1473
Wellington 6140

Via email: gasfuelpolicy@mbie.govt.nz

Proposed regulatory regime for carbon capture, utilisation, and storage

1. The Taranaki Regional Council (the Council) welcomes the opportunity to submit on the proposed regulatory regime for carbon capture, utilisation, and storage (CCUS). The oil and gas industry is a key contributor to Taranaki's economy and the energy security of the country. But with climate change posing a systemic threat to communities and ecosystems, we know the country must reach our emissions targets. CCUS can be a key tool to support the transition to a low emissions future.
2. While CCUS has the potential to be an important tool, it is but one amongst many. Successful climate change mitigation requires action across a wide range of fronts. This includes both technological innovation, scaling up existing mitigation options and behaviour change. CCUS cannot be used as an excuse to not prioritise wider mitigation activities and the shift to less carbon intensive lifestyles. We also note that direct air capture technology in particular remains nascent and its ability to support emission reduction uncertain.
3. In developing a regulatory regime for CCUS care is needed to ensure that risks are managed without creating unnecessary costs. The underlying idea behind CCUS – long-term storage of gasses or liquids in geological systems – is not new in New Zealand. The injection and storage of gas and liquid underground has been successfully managed in Taranaki for many years. Accordingly, any regulatory regime should utilise existing mechanisms, such as the Resource Management Act 1991 and the Crown Minerals Act 1991, as much as possible. It should also leverage the considerable expertise that has been developed in Taranaki, both in the Council and more broadly.
4. There are however regulatory gaps that need consideration. The Council supports the development of a permitting regime for CCUS that focuses on the allocation of suitable sites for CCUS activities and the management of liability. The Council supports the liability system proposed in the consultation document, on the grounds that it is accompanied by a thorough test of the applicant's financial fitness through the permitting process. We also note that care is needed to ensure the monitoring needed for a successful liability regime is not duplicated by monitoring required under the RMA.
5. If CCUS is to be economically viable, it has to be well integrated with the New Zealand Emissions Trading Scheme (ETS). ETS participants directly storing their own carbon emissions, either through their own operations or through a contracting arrangement, should be able to easily subtract the CO2 stored from their overall emissions. Further, businesses deploying storage technologies as a service should have the option of either claiming credits from the market or entering into specific contracting arrangements with emitters.
6. The Council looks forward to further engagement with the Government as the regulatory system is developed.
7. This submission has been consulted with the members of the Council's Policy and Planning Committee out of session via email. It will be formally considered at the next meeting of the Committee on 3

September 2024. Any further comments or amendments from the Committee will be provided after that meeting.

Yours sincerely,

S J Ruru
Chief Executive

Proposals for a Regulatory Regime for Carbon Capture, Utilisation and Storage

Consultation document
June 2024

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Te Kāwanatanga o Aotearoa
New Zealand Government

Ministry of Business, Innovation and Employment (MBIE)
Hīkina Whakatutuki – Lifting to make successful

MBIE develops and delivers policy, services, advice and regulation to support economic growth and the prosperity and wellbeing of New Zealanders. MBIE combines the former Ministries of Economic Development, Science and Innovation, and the Departments of Labour, and Building and Housing.

More information

Information, examples and answers to your questions about the topics covered here can be found on our website: www.mbie.govt.nz or by calling us free on: 0800 20 90 20.

Disclaimer

This document is a guide only. It should not be used as a substitute for legislation or legal advice.
MBIE is not responsible for the results of any actions taken on the basis of information in this document, or for any errors or omissions.

Online: ISBN 978-1-991143-95-2

July 2024

Contents

Minister's foreword

The Government is committed to ensuring New Zealand has a resilient energy system that meets our needs as we move towards a lower emissions economy. The proposed regulatory regime for Carbon Capture, Utilisation and Storage (**CCUS**) will help achieve this.

There is growing international momentum for CCUS. CCUS is an important technology for reducing global emissions, and around the world, successful CCUS projects have been supported by clear and enabling regulation. It is important that New Zealand also seizes this opportunity.

A regulatory regime for CCUS would allow New Zealand's industries to access CCUS technology on a level playing field with other emissions reduction and removal tools to support a least cost transition towards net zero emissions.

Enabling industries to access CCUS will also support security of gas supply. CCUS will attract investment, helping to reverse the current sharp decline in gas production and make sure that gas is available as we transition to a low emissions economy.

It is important that we design a CCUS regulatory regime that works for New Zealand, particularly making sure the CO2 stored underground stays there. We seek your feedback on proposals to:

- recognise emission reductions or removals resulting from CCUS activities through the Emissions Trading Scheme
- ensure emission reductions are monitored and accurately reported
- mitigate the risk of CO_2 leakage from sites storing CO_2
- appropriately assign the liability for the storage sites.

The Government also wants to reduce barriers to the use of CCUS, so the document also seeks feedback on whether there are:

- any barriers to obtaining consents or permits for CCUS activities in New Zealand
- any other barriers to capturing CO_2 to use it for the benefit of our economy.

I welcome your feedback on these proposals and issues, which is essential to help our Government create an effective CCUS regulatory regime.

Please provide feedback on the proposals to gasfuelpolicy@mbie.govt.nz by 5pm on 6 August 2024.

Hon Simeon Brown

Minister for Energy

Background

Carbon capture, utilisation and storage (**CCUS**) is regarded by the Intergovernmental Panel on Climate Change (**IPCC**)[1] and the International Energy Agency[2] (**IEA**) as an important way to reduce emissions from industries such as natural gas production and petrochemical manufacture. The consultation document discusses proposals for enabling carbon capture and storage and asks about barriers to the economic utilisation of CO_2.

Carbon capture and storage (**CCS**) is the process of capturing and storing CO_2 to prevent it from entering the atmosphere. The IPCC has expressed high confidence that permanent underground storage of CO_2 using these technologies can be achieved. It has stated that "…the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years."[3] It has also expressed the need for effectiveness and robustness of regulatory systems to ensure the safe and reliable deployment of CCUS technologies.

Carbon capture and utilisation (**CCU**) refers to the process of capturing CO_2 and using it either directly or indirectly to create valuable products and materials. In New Zealand these uses range from dry ice to chill meat and sea food exports to a welding gas for heavy steel construction. Internationally, new utilisation pathways in the production of CO_2-based synthetic fuels, chemicals and building aggregates are also gaining momentum. The IEA estimates that just under 15 Mt of CO_2 per year could be captured globally for these new uses by 2030, including around 8 Mt CO_2 in synthetic fuel production.

CCUS has been deployed at scale in countries around the world. Further background information can be found in the accompanying 'A Background to CCUS' document.

CCUS has the potential to deliver three significant benefits for New Zealand:

1. Allowing industries to access CCUS technology on a level playing field with other emissions reduction and removal mechanisms will better enable a least cost transition. Businesses will be able to choose the technology that is right for them and that provides the best 'bang for buck' emissions reduction approach that suits their needs.
2. CCUS technology can reduce the cost of gas production, especially for higher CO_2 content gas fields. This could promote investment, leading to a reversal in the current sharp decline in gas production.4 The natural gas sector plays a critical role in the New Zealand economy and natural gas will be a key energy source during our transition to a low emissions economy. This includes it as a source of electricity generation when renewable generation is not able to meet demand.
3. Allowing CCUS has the potential to decrease New Zealand's cost of reducing emissions and assist with ensuring the international competitiveness of our businesses and our energy system.

Enabling carbon capture and utilisation will have the additional benefit of improving the resilience of New Zealand's CO_2 supply chain.

Globally, Governments are developing enabling regulatory environments for CCUS

Around the world, successful CCUS projects have been supported by clear and enabling regulation. In Australia, regulatory frameworks are being developed to streamline the approval and operation of CCUS projects. The European Union (**EU**) has incorporated CCUS into its comprehensive regulatory strategy

[1] The IPCC is a United Nations body responsible for assessing the science related to climate change.
[2] The IEA is an intergovernmental organisation that provides data, analysis, and policy recommendations on global energy issues.
[3] https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf
[4] Natural gas production in New Zealand is currently declining more quickly than expected leading to concerns about security of energy supply.

including the EU Emissions Trading System which enables parties to achieve a financial benefit for carbon capture and storage. Norway has established clear regulations for CO_2 storage and transport, supporting projects like Northern Lights[5] by providing a stable legal framework. Canada has implemented legislation to support CCUS, including tax incentives and regulatory measures to ensure safe and effective CO_2 storage and utilisation. Further international comparison can be found in the Annex and the accompanying 'A Background to CCUS' document.

New Zealand Government's position on CCUS

The Government's position on CCUS in New Zealand, subject to consultation, is that it should be available to industry as a means of reducing and removing emissions. The Government's role is not to provide financial incentives but to create a clear regulatory landscape for CCUS that provides a level playing field for reduction and removal activities. The decision to deploy CCUS will rest with individual businesses.

The Government's overall approach is to ensure the right incentives are in place across the economy to reduce net emissions where it is most cost-effective to do so. To grow and increase productivity, New Zealand needs to follow the most efficient, flexible, and cost-effective pathway to net zero 2050. This means taking a net-based approach that treats emissions reductions and removals the same.

This document describes the Government's proposed approach to enabling CCUS. This consists of proposals for:

1. Treatment of CCS activities under the Emissions Trading Scheme (**ETS**)
2. A CCS monitoring regime
3. Liability for CO_2 storage sites
4. Consenting and permitting for CCUS
5. Understanding any barriers to carbon capture and utilisation.

The objectives for this proposed approach are:

1. Efficient emissions abatement — creating a level playing field for emissions reduction/removal technologies to enable businesses to reduce/remove emissions at least cost.
2. Environmental integrity — ensuring that the CO_2 storage sites and the emissions sequestered in those sites are monitored and accurately reported, the risk of CO_2 leakage from these sites is mitigated, and the liability for the storage sites is appropriately assigned.
3. Energy security — supporting security of energy supplies as we transition to a low-emissions economy.

We invite you to provide feedback on the Government's proposals. Following public consultation, the Government will make in-principal decisions on whether to include CCUS policies as part of the government's second emissions reduction plan.

Questions for consultation

1. **Do you agree that the government should establish an enabling regime for CCUS? Please provide any further information to support your answer.**

[5] The Norway Northern Lights Project is a collaborative initiative in Norway to capture CO_2 emissions from industrial sources and store them permanently underground in the North Sea.

2. **Do you agree with our objectives for the enabling regime for CCUS? Please provide any further information to support your answer.**

Treatment under the Emissions Trading Scheme

How CCS activities are currently treated under the Emissions Trading Scheme

The Emissions Trading Scheme (**ETS**) incentivises net emissions reductions by putting a price on emissions from the production or consumption of energy sources such as electricity, gas, diesel, petrol and coal. For the energy sector, the emissions price flows through into the price of energy sources that create emissions when they are produced or consumed.

However, the ETS does not currently include mechanisms to recognise (and therefore reward) emission reductions or removals resulting from CCS activities, apart from forestry removals[6] and geothermal reductions[7].

CASE STUDY: GEOTHERMAL REINJECTION OF CO_2 AT NGĀWHĀ

The Ngāwhā geothermal field, owned by Top Energy, is a geothermal area in the North Island. It is the only high-temperature geothermal field in New Zealand located outside the Taupo Volcanic Zone. The geothermal power station in Ngāwhā has been operating since 1998, generating power for the Far North.

The CO_2 and other gases in geothermal systems are naturally occurring. Underground the CO_2 is dissolved in liquid (geothermal fluid). This liquid boils when it moves up production wells, and the CO_2 is released into the steam. The steam is then utilised for power generation.

For many years it has been standard practice in the geothermal industry to reinject the cooled geothermal fluid back underground (after it has travelled through the surface plant/power station) while any CO_2 gas is vented into the atmosphere).

Unlike other geothermal power stations, where some CO_2 is naturally released through cracks in the ground, Ngāwhā has an impermeable cap rock which stops this from happening. Consequently, the geothermal field at Ngāwhā has a relatively high concentration of CO_2 compared to other geothermal sites, and a large ETS surrender obligation (previously accounting for roughly 30 per cent of the project's revenue).

Under the *Climate Change (Unique Emissions Factors) Regulations 2009*, a geothermal fluid user may apply for approval to use a unique emissions factor (**UEF**) for a particular geothermal plant. Using the UEF, a geothermal ETS participant can subtract CO_2 reinjected into geothermal fields from its ETS liability.

To reduce its ETS obligation, Ngāwhā has been trialling the reinjection of CO_2 into the ground. CO_2 is dissolved into the geothermal reinjection liquid and pumped back underground instead of being vented. The reinjected CO_2 then becomes part of the existing geothermal reservoir.

[6] Forestry removals are rewarded because trees absorb CO_2 from the atmosphere, helping offset emissions from other sectors.
[7] Geothermal CCS activities can apply for a unique emissions factor, acknowledging CCS can further reduce emissions from geothermal energy.

Top Energy had budgeted six million dollars for the project, but the project team delivered it at only "a couple of hundred thousand dollars."[8] As the geothermal fluid was already returned underground, any extra infrastructure needed to reinject the CO_2 was minimal.

In the first half of 2023, about 35,000 tonnes of CO_2 equivalent (tCO_2-e) was re-injected back underground at Ngāwhā. This represents a saving about 2.5 million dollars' worth of emission units at a carbon price of $70 per tCO_2-e. Once all the power plants at Ngāwhā reinject their GHG emissions, the annual carbon credit savings could reach $10m a year at that carbon price.[9] The company has set a goal of becoming fully net zero by the end of 2025.

The inability of (non-geothermal) businesses investigating storage activities to either receive emissions units or reduce their ETS liability is affecting commercial interest in CCS. Further information on this problem can be found in the supporting Regulatory Impact Statement (**RIS**).

How CCS is treated in other jurisdictions with carbon-pricing schemes

In jurisdictions with enabling regulatory frameworks and clear incentives for CCS activities (such as ETS recognition of the associated emission reduction/removal), CCUS deployment and planned deployment has increased.[10] Australia's Carbon Credit Unit Scheme allows storage projects to be awarded carbon credit units if project activities capture greenhouse gases and inject them for permanent underground storage. Capture, transport and storage installations are also explicitly included in the European Union ETS. For more information on the treatment of CCUS in overseas carbon-pricing schemes, please refer to the Annex.

Our proposed approach for how CCS activities are treated under the ETS

We propose that the ETS include mechanisms to recognise (and therefore reward) emission reductions or removals resulting from storage activities. One tonne of CO_2 captured and stored would be equivalent to one tonne of emissions reduction under the ETS. These reductions or removals would also count towards our emission targets in international emissions accounting. We propose:

1. That ETS participants carrying out storage activities be able to subtract emissions captured and stored from its own activity through CCS projects, for the purpose of estimating its ETS liability.
2. Alternatively, businesses deploying storage technologies could choose to capture CO_2 to receive New Zealand emissions units (**NZU**) for their removals (similar to how owners of forestry land receive NZUs for their removals). These businesses would need to have a clear mechanism for sequestering the CO_2. This could enable the development of direct air capture technologies or could enable a market for storage of CO_2 from third-party emitters.

To avoid double-counting, ETS participants subtracting emissions captured and stored from ETS liability would not be allowed to receive NZUs for those stored emissions.

Questions for consultation

3. **Should the ETS be modified to account for the emissions reductions achieved using CCS? If so, how do you think it should be modified?**

8 https://www.youtube.com/watch?v=4a91R1sK5ck

9 https://topenergy.co.nz/assets/16.0-Top-Energy-Sustainability-Report-23-Online01.jr.pdf

10 https://www.globalccsinstitute.com/resources/publications-reports-research/global-status-of-ccs-2023-executive-summary/

4. **Do you agree that all CCS activities should be eligible to receive recognition for the emissions captured and stored? If not, why not?**
5. **Do you think there should be a separate non-ETS mechanism for providing economic incentives for CCS? If so, what would this mechanism be?**

Monitoring regime for CCS activities

How CCS activities are currently monitored in New Zealand

Businesses carrying out CCS activities (outside of the geothermal and forestry sectors) are currently not subject to regulations for monitoring and reporting emissions removal/storage associated with CCS activities.

Under the *Resource Management Act 1991* (**RMA**) geothermal CCS projects are subject to monitoring requirements to ensure environmental protection. Geothermal projects are required to develop and implement environmental monitoring plans as part of their resource consent conditions.

How CCUS is monitored in other jurisdictions

Australia requires CCUS projects to provide plans outlining how the project will be undertaken, including operations of the storage site and monitoring, verification and reporting activities. To sequester emissions through CCUS the project operator must obtain a licence under the applicable regulations. Following the cessation of injection activities, the licence holder must apply for a site closing certificate (**SCC**). If this application is accepted, a pre-SCC may be issued. The pre-SCC sets out a monitoring and verification program, as well as a required level of financial security to cover the costs of that program.

The EU also has a monitoring regime and extensive requirements for selecting storage sites for CO_2. This includes continuous monitoring of CO_2 injection rates and storage pressure, environmental monitoring and post-closure monitoring to ensure long-term storage integrity and safety. The Annex contains more information on overseas monitoring regimes.

Our proposed approach for a CCS monitoring regime

Our proposed approach is to create regulations similar to those in Australia[11] and the EU, to require a CCUS operator to monitor CO_2 storage sites, and collect the following information:

1. CO_2 captured
2. CO_2 leakage during transportation and injection
3. CO_2 sequestered in a storage site
4. migration and leakage of CO_2 from a storage site.

Collecting this information would enable the regulator to monitor how much CO_2 is captured, who captures it, who sequesters it, how much (if any) is leaked during transfer to the storage site, and how much (if any) is leaked after the storage site is closed. This would enable tracking the source of the CO_2 captured and where it ends up being stored, minimising the risk of double-counting emissions reduction.

In these regulations we propose setting out the relevant accounting and reporting rules, as well as the regime for inspection of CO_2 storage sites for verification purposes.

[11] Australian Government, Regulation 4.12, *National Greenhouse and Energy Reporting Regulations 2008*, https://www.legislation.gov.au/F2008L02230/latest/downloads

The regulations would also include an audit and compliance regime. They would set out the powers needed, such as right of entry, to ensure the site could be effectively monitored. The compliance regime would also set out penalties associated with non-compliance. The audit and compliance regime would be consistent with comparable existing regimes in the ETS[12] and the *Crown Minerals Act 1991* (**CMA**).

The CCUS operator would be obliged to be a participant in the ETS until it was no longer deemed to be responsible for a CO_2 storage site. In the case of CO_2 leakage from a storage site, the CCS operator would either have to:

- surrender emissions units, or
- store an equal amount of CO_2 without receiving emissions units.

Questions for consultation

6. **In your opinion, which overseas standards for monitoring, verification and reporting of CCUS-related information should New Zealand adopt?**
7. **Is there any other information that CCS project operators should be required to verify and report? Please reference the relevant overseas standards where applicable.**
8. **What methods should be used to quantify CO_2 removal and storage in CCUS projects?**
9. **Are additional mechanisms required to ensure compliance with monitoring requirements?**
10. **What level of transparency and information sharing is required?**
11. **Do you consider there should a minimum threshold for monitoring requirements so that small-scale pilot CCS operators would not have to comply with them? If so, what should be the threshold?**
12. **Should a monitoring regime extend to CCU activity?**

Liability for CO_2 storage sites

Existing mechanisms for long-term liability of CO_2 storage sites

Currently, unlike Australia and the EU, New Zealand does not have any regulatory regime designed specifically for establishing liability for CO_2 storage sites. Consent conditions (such as those requiring a bond) could be used for managing long-term liability for maintenance and remediation of CO_2 storage sites. However, it is not clear how this would work in practice (see supporting RIS for more information).

How CCUS liability is managed in other jurisdictions

In Australia, if a CO_2 storage facility is decommissioned, liability for CO_2 leakage still exists. The liability for CCS projects is typically specified in regulatory approvals granted by relevant authorities. The project operators may be required to provide financial assurance or secure funds to cover post-closure activities, including long-term liability management. When a site closing certificate is issued, project operators remain liable for a minimum of 15 years. Following this period if the Minister is satisfied there are no significant risks of leakage, the liability may be transferred to the Government.

[12] https://www.epa.govt.nz/industry-areas/emissions-trading-scheme/participating-in-the-ets/compliance-in-the-ets/

The EU framework is similar to the Australian regime, except it provides for a minimum 20-year closure assurance period. More information on the overseas regimes for CCUS liability is available in the Annex.

Our proposed approach on liability for CO_2 storage sites

We are proposing an approach similar to the model used in Australia. It would require a clear and thorough permitting framework for keeping records of CCS operations and CO_2 storage sites.

Operators who are responsible for CO_2 storage sites would be required to:

1. apply for permits for activities relating to exploring and injecting CO_2 into storage sites
2. submit and gain approval for their plans to monitor stored carbon
3. monitor leakage and migration of CO_2, environmental impacts, and the safety and integrity of the storage site
4. in the event of leakages of CO_2 or significant irregularities, notify the government and pay appropriate compensation
5. before the closure of a CO_2 storage site, record and report information on the site closure plans, closure cost estimates, a closure completion report, and evidence demonstrating that the sites can technically be used for CO_2 storage and will have no or negligible risk of leakage
6. complete a financial capability assessment if requested, to determine the operator's ability to meet the costs of maintaining or remediating the site.

If a CCUS operator is an owner of an underground oil or gas reservoir which has been repurposed from oil or natural gas production to CO_2 storage, it will still be subject to the requirements under the CMA or *Exclusive Economic Zone and Continental Zone (Environmental Effects) Act 2012* (**EEZ Act**) applicable to decommissioning of petroleum infrastructure on the site, unless the Minister grants an exemption.

A CCUS operator would be responsible for any issues at its CO_2 storage site for a set period after the site's closure. The government could then opt to indemnify the operator against any liability after that period if the responsible Minister were satisfied that there is no significant risk of leakage and adverse environmental impacts.

The proposed approach will also make provisions for trailing liability — if a storage site is sold and the new owner is not able to meet the liability obligations, the previous owner would be liable for the CO_2. The trailing liability approach would be based on the provisions in the CMA.

Civil pecuniary penalties would apply to failure to comply with the monitoring and information disclosure requirements, while it would be a criminal offence not to close or remediate the CO_2 storage site in line with the closure plan submitted to the regulator.

Questions for consultation

13. **Do you agree the proposed approach on liability for CO_2 storage sites aligns with other comparable countries (like Australia)? If not, why not and how should it be changed?**
14. **Is the proposed allocation of liability consistent with risks and potential benefits? Are there other participants that should share liability for CCS operations?**
15. **Should liability be the same for all storage sites if projects are approved? Or should liability differ, depending on the geological features and characteristics of an individual storage formation?**

16. **Do you consider there should a minimum threshold for CCUS operators being held responsible for liability for CO_2 storage sites so that small-scale pilot CCS operators would be exempt? If so, what should be the threshold?**
17. **Should the government indemnify the operator of a storage site once it has closed? If so, what should be the minimum time before the government chooses to indemnify the operator against liabilities for the CO_2 storage sites?**
18. **Are additional insurance mechanisms or financial instruments required to cover potential liabilities from CO_2 leakage in CCS projects?**
19. **What measures should be implemented to monitor CCS projects for potential leakage and ensure early detection?**
20. **Do you agree that trailing liability provisions are needed? How do you think they should be managed?**

Consenting and permitting for CCUS

Current consenting and permitting for CCUS in New Zealand

The current regulatory settings for consenting CCUS are broadly neutral - neither enabling nor disabling.[13] Consenting for CCUS onshore and within 12 nautical miles offshore is covered under the *Resource Management Act 1991* (**RMA**). The *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* (**EEZ Act**) covers CCUS consenting for operations in the exclusive economic zone and extended continental shelf.

Beyond the consenting regime under the RMA and the EEZ Act, the CMA and property rights may also be relevant. The CMA does not authorise nor prevent CCUS operations that would otherwise require consents under the RMA or the EEZ Act. In addition to consents under the RMA or EEZ Act, first-party CO_2 re-injection that is part of petroleum mining may need approval under the CMA but not for private land. Other types of CO_2 injection may require the consent of landowners.

We are seeking feedback on the existing consenting and permitting pathways for CCUS

New Zealand currently has a neutral policy environment for consenting so we are not proposing any changes in this document. We are aware of some inconsistencies across the consenting legislation, but it is not clear this is an impediment to investment. Geothermal plants are already piloting CCUS activities, but other larger emitters may face more impacts of inconsistencies in consenting pathways and other regulations.

Questions for consultation

21. **Are inconsistencies in existing legislation for consenting and permitting impacting investment?**
22. **Should the permit regime for CCUS operations be set out in bespoke legislation or be part of an existing regulatory regime (such as the RMA, EEZ Act, the CMA or the Climate Change Response Act 2002)? Please give reasons for your answer.**

[13] https://www.mbie.govt.nz/dmsdocument/27265-carbon-capture-and-storage-taking-action-under-the-present-law-pdf

23. **Should CCS project proponents be required to submit evidence that proposed reinjection sites are geologically suitable for permanent storage, in order for projects to be approved? If so, what evidence should be provided to establish their suitability?**

24. **Should there be separate permitting regime for CCU activity if there is no intention to store the CO_2?**

Carbon capture and utilisation

Existing carbon capture and utilisation in New Zealand

CCU provides an opportunity to use captured CO_2 for various industrial and commercial uses. Currently CO_2 is used to:

a) Produce dry ice including for primary sector exports of meat and seafood (around 7% of seafood and 2% of meat exports) – this accounts for around 20 per cent of CO_2 use.

b) Produce beer – this accounts for around 15 per cent of our CO_2 use.

c) Serve beverages – around 11,000 hospitality venues rely on CO_2.

d) Package dairy exports such as milk powder – around $450m per annum of exports.

e) Improve the growth of greenhouse crops – such as tomatoes and capsicum.

f) Help weld heavy steel construction – such as bridges – as part of the welding gas mix.

g) Increase the shelf life of packaged products – especially meat, which reduces waste.

h) Help treat our drinking water to make it safe.

i) Supply the active gas for fire suppression systems.

There are also emerging uses for CO_2 in the production of synthetic fuels, chemicals and building aggregates. While these novel uses are still in the early stages of development, we want to make sure New Zealand can take advantage of international developments.

Todd Energy's Kapuni plant is New Zealand's single domestic supplier of CO_2 – the rest of our CO_2 is imported. Having a single domestic producer means there is limited resilience in the supply chain (case study below).

CASE STUDY: New Zealand's 2022/23 CO_2 shortage

In 2023, New Zealand experienced a significant CO_2 shortage. This had considerable impact on various industries, particularly for food and beverage production.

The closure of the Marsden Point oil refinery in April 2022 caused a reduction in the domestic supply of CO_2. In response, Todd Energy's Kapuni plant, the remaining domestic supply source, increased supply and the two main CO_2 suppliers, BOC and Air Liquide, increased imports.

Kapuni faced a temporary shutdown at the end of 2022 due to a safety concern. This resulted in an acute shortage of CO_2, that saw significant price increases for CO_2. The shortage was managed in a matter of months and the Kapuni plant resumed production alleviating supply pressures. However, the price of CO_2 remains higher than pre-shortage levels.

MBIE undertook analysis of a potential extended shortage which indicated there could be an adverse impact on core primary sector activity, including dry ice enabled meat and seafood exports and packaging for dairy exports. In both cases, there is a risk to New Zealand's reputation as an exporter of high-quality primary produce.

The shortage highlighted the need for New Zealand to explore alternative CO_2 sources and technologies, such as CCU to mitigate future supply disruptions.

We are seeking feedback on whether there are barriers to CCU

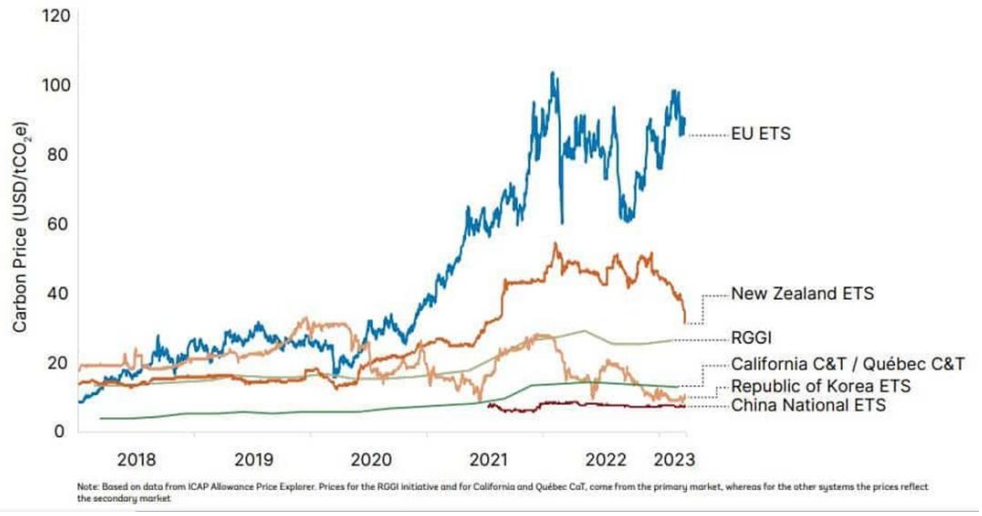
There are existing utilisation projects in New Zealand, the largest being CO_2 capture at Todd Energy's Kapuni plant. As CO_2 is a valuable input for various supply chains in New Zealand, we want to ensure an enabling environment for potential proponents to capture and utilise CO_2. We are seeking feedback on whether there are any regulatory or policy barriers to investment and adoption of utilisation technologies.

Questions for consultation

25. **Are there regulatory or policy barriers to investment and adoption of CCU technologies?**
26. **What potential markets for CO_2 derived products do you see as most critical in New Zealand?**
27. **Are there any specific barriers to transportation of CO_2?**

Annex: international approaches to CCUS

Treatment of CCUS in overseas carbon pricing schemes

Australia	Australia's Carbon Credit Unit Scheme lets companies earn Australian carbon credit units (**ACCUs**) for each tonne of carbon stored or avoided. The units may then be sold to the federal government, or on the secondary market to provide revenue. In the secondary market, private buyers purchase ACCUs to voluntarily offset their emissions or meet compliance requirements. CCS projects are included in the scheme, and can be awarded ACCUs if project activities capture greenhouse gases and inject them for permanent underground storage.[14]
EU	The EU's Directive 2009/31/EC on the geological storage of CO_2 (**CCUS Directive**) establishes the overall legal framework for the environmentally safe geological storage of CO_2.[15] Since the 2015 amendment to the EU Emissions Trading System Directive (**EU ETS**), capture, transport and storage installations are explicitly included in the EU ETS – CO_2 that is captured and safely stored (ie CCS projects) are considered as 'not emitted'. Currently, the EU ETS does not reward CCUS due to lack of evidence and methodologies. The EU quota system establishes a maximum level of total emissions. This ceiling is reduced on an annual basis to ensure that contributions are made toward the system's set emission target when the relevant quota period expires. Quotas are either auctioned or allocated free. In recent years, the CO_2 price in the EU quota system has been increasing. FIGURE 1 PRICE EVOLUTION IN SELECTED ETSs FROM 2018 TO 2022  Note: Based on data from ICAP Allowance Price Explorer. Prices for the RGGI initiative and for California and Québec CaT, come from the primary market, whereas for the other systems the prices reflect the secondary market.
Norway	Norway joined the EU ETS in 2008. Norwegian companies are subject to the same quota obligations as those in the EU. In addition, Norway has a carbon tax on all combustion of

14 https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods/carbon-capture-and-storage-method

15 https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0114:0135:EN:PDF

	gas, oil and diesel in petroleum operations on the continental shelf and on releases of CO_2 and natural gas. The combination of the CO_2 tax and a quota obligation (under the EU ETS) means that companies operating on the Norwegian continental shelf face an extremely high price per tonne for CO_2 they emit. Emissions pricing measures in Norway have incentivised two world leading CCUS projects, (Sleipner in 1996, and Snøhvit in 2008). Both facilities separate CO_2 from their respective produced gas, then compress, pipe and reinject it underground. More recently, the Norwegian government is supporting the Longship CCUS project, which is the first industrial CCUS chain in construction under the current European legal framework. This includes: 4. a CO_2 capture project at the Heidelberg Materials cement factory in Brevik 5. a CO_2 capture project at the Hafslund Celsios' Waste to Energy facility in Oslo 6. the 'Northern Lights' transport and storage infrastructure (the final part of the Longship CCUS chain). CO_2 captured from across Europe can be transported and stored at the Northern Lights offshore storage facility in the North Sea.
Canada	Canada has a Federal Carbon Pricing System, which is set out under the Canadian *Greenhouse Gas Pollution Pricing Act*.[16] The system includes a 'fuel charge' (a regulatory charge on fossil fuels like petrol and natural gas) and a separate performance-based regulatory emissions trading system designed to ensure that there is a price incentive for industrial emitters to reduce GHG emissions (including by use of CCUS). Projects that enable permanent CO_2 storage are also eligible for a refundable CCUS investment tax credit.[17] The credit is valued at $3.1 billion over the first five years, and around $7.6 billion up to 2030.

16 https://laws-lois.justice.gc.ca/PDF/G-11.55.pdf

17 https://www.canada.ca/en/department-finance/news/2022/08/additional-design-features-of-the-investment-tax-credit-for-carbon-capture-utilization-and-storage-recovery-mechanism-climate-risk-disclosure-and-k.html

Overseas monitoring regimes for CCUS

Australia	To participate in the Australian Carbon Credit Union Scheme, CCUS project operators must develop, and implement a CCUS project plan. This plan must outline how the project will be undertaken, including characteristics and operation of the storage site, and monitoring, verification and reporting activities. Project operators must demonstrate to regulators that storage reservoirs will not leak, and must monitor and verify that underground storage of project emissions remains secure. This includes monitoring wells and undertaking seismic surveys. If all injection activities have ceased, the licence holder for a storage operation must apply for a site closing certificate. If this application is accepted by the responsible minister, a pre-site closing certificate may be issued setting out a monitoring and verification program, as well as a required level of security to cover the costs of that program. Australia's National Greenhouse and Energy Reporting Scheme[18] provides the framework for counting emissions. The framework requires industry to share information about captured emissions, emissions stored underground, leaked emissions, and emissions sent to, or imported from, another country.
EU	The EU has extensive requirements for selecting storage sites for CO_2.[19] A site can only be selected if prior analysis shows that, under the proposed conditions of use, there is no significant risk of leakage or damage to human health or the environment. If leakage does occur, operators must surrender emission allowances for any resulting emissions under the EU ETS. The monitoring regime in the EU includes: • monitoring and reporting CO_2 emissions • tracking capture efficiency • monitoring to ensure safe and efficient transport of CO_2 • continuous monitoring of CO_2 storage sites to verify integrity • utilisation monitoring systems.
Canada	Canadian provinces (such as Alberta, Saskatchewan, and British Columbia) hold much of the responsibility for regulating requirements for measurement, monitoring, verification and oversight of geological storage. However, there are federal responsibilities for certain aspects. As of 2017, all facilities engaged in CCUS activities are required to report the amounts of CO_2 captured, transported, injected (or used for enhanced oil recovery), and geologically stored to the Government of Canada. Facilities must also report CO_2 emissions (leakages) from equipment or infrastructure used in CCUS activities and from geological storage sites.

18 https://www.dcceew.gov.au/climate-change/emissions-reporting/national-greenhouse-energy-reporting-scheme

19 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0031

Overseas regime for liability for CO_2 storage sites

Australia	The liability for CCUS projects is typically specified in regulatory approvals granted by relevant Australian authorities. The project operators may be required to provide financial assurance or secure funds to cover post-closure activities, including long-term liability management. If all injection activities have ceased the licence holder must apply to the responsible minister for a site closing certificate, who must decide on the application within 5 years of the application date. Once a site closing certificate is issued, at least 15 years must elapse before the responsible minister may declare a closure assurance period. The responsible minister must be satisfied that there are no significant risks of leakage. If the minister is not satisfied, the closure assurance period is not declared. After the closure assurance period is declared, the government must indemnify against liability if the storage formation was specified under the GHG licence, and a site closing certificate is in force. This means that the state becomes liable for the risk of future damages.
EU	Directive 2009/31/EC[20] of the EU establishes that long-term liability for CCUS activities is eventually transferred to Member States. The EU framework functions similarly to Australia's, in that it provides for a minimum 20-year closure assurance-like period. Several conditions must be met prior to transfer of liability, including that "the CO_2 [must] be completely and permanently contained". A report must be published by the operator before liability can be transferred, demonstrating that the storage site is evolving towards a situation of long-term stability. A security must be paid by the operator to cover at least the cost of monitoring and post-transfer obligations of a Member State for a period of 30 years.

20 Directive 2009/31/EC of the European Parliament and of the Council [2009] OJ L 140/114.

Our Reference
F22/55/007-D24/41284

Kia ora

Taranaki Mayoral Forum Submission on the Second Emissions Reduction Plan Discussion Document

1. The Taranaki Mayoral Forum is very concerned that the country is not on track to meet its emissions targets. Successful mitigation is the most effective and efficient way to stop the threat climate change poses to our communities. That some of the reasons we are no longer on track are outside the Government's control does not change the fact that stronger action is needed.

2. We support a least-cost approach to emission reductions. However, we are doubtful that only focusing on net reductions will deliver this. Carbon removal through forestry cannot be relied upon forever to drive mitigation and carries a range of risks. The longer the country leaves action on reducing gross emissions, the greater the risk of either a failure to abate or transition shocks. This would bring significant costs. Conversely, successful mitigation will result in a more resilient economy and reduce the adaption requirements on our communities.

Managing Transition Risks

3. We are also very disappointed by the scrapping of a range of work programmes aimed at supporting the transition to a low-emissions future, many of which were targeted at Taranaki. Whether this transition be Government-led or market-led, the impact on our region will be the same. The reversal of the oil and gas exploration ban may provide some economic activity, but the long-term challenge remains: how to transition Taranaki away from an economy built around oil and gas. Our communities need new opportunities to provide for their economic wellbeing. While the responsibility for this by no means falls on Government alone, it is a key player.

4. Providing efficient regulatory pathways for new low-emissions industries, such as offshore wind or hydrogen production, is a vital part of Taranaki's long-term economic well-being. We welcome the work underway in these areas and its prioritisation. More broadly, we call on the Government to support the vision of Taranaki being a centre of renewable technology excellence for New Zealand. There is a wealth of energy expertise in the region that is ready to turn their abilities towards renewable technologies. This includes the organisations such as Venture Taranaki and Ara Ake. Taranaki's world-class wind resource and ample sunlight is waiting to be harnessed. And our location in the North Island, close to major demand centres, offers transmission benefits.

The Emissions Trading Scheme

5. To avoid the unintended consequences of mitigation, we support the introduction of restrictions on whole-farm conversion to forestry on highly productive land. The locking up of large swathes of the country in certain exotics, mainly *Pinus radiata*, carries with it a range of risks. Risks from the impacts of pests, diseases and extreme weather events undermining long-term carbon storage, in addition to wilding pine problems. There are also costs associated with the toll logging trucks take on local roads, and the reduced contribution forestry makes to the regional economy compared to farming.

Te Kaunihera-ā-Rohe o Ngāmotu
New Plymouth District Council

TE KAUNIHERA Ā ROHE O
WHAKAAHURANGI
STRATFORD
DISTRICT COUNCIL

forestry conversion requires careful

6. Any restriction on development, and we caution against a blunt restriction based on land use classification alone. All exotics do not carry the same risks – some can also provide important benefits; for example, for land stabilization. Neither do all locations. There may be local circumstances where conversion is, or is not, warranted that land use classification does not capture. Any restrictions need to be based on a nuanced assessment of different species, land use and other environmental benefits. An approach that allows for regional flexibility and local decision making is needed.

7. Further work is also required to incentivise native reforestation as a mitigation tool. Biodiversity credits offer a potentially powerful tool to make up the financial short-fall of native planting vs. exotics under the New Zealand Emissions Trading Scheme (NZ-ETS). There is also considerable opportunities for catchment-level engagement, including by the Government, to support individual land-owners in their planting efforts.

8. Other carbon sequestration options also need to be recognised. The Government's proposal to develop a regime for carbon capture, utilisation and storage is a potentially useful pathway, particularly with the reversal of the oil and gas exploration ban. However work on blue carbon, soil carbon and wetland sequestration accounting methodologies also require priority. The latter two could be particularly useful in recognising on-farm sequestration as part of a pricing system for agricultural emissions.

Sector Matters

9. The emphasis on giving agricultural producers the tools and technologies they need to reduce emissions, while maintaining productivity and profitability, is welcome. As international markets place greater pressure on our sectors to reduce emissions, it is crucial our producers have what they need to succeed. To protect our export industries, New Zealand must not fall behind in meeting international expectations. Government investment and regulation of agricultural emissions needs to be developed with these international expectations in mind. We also strongly recommended a focus on supporting diversification, such as through Taranaki's Branching out Programme.

10. We commend the Government's decision to exempt local authorities from the Credit Contracts and Consumer Finance Act 2003 so that we can restore voluntary targeted rates schemes. This gives councils an important tool to support their communities to improve their energy efficiency and reduce their dependence on natural gas if they so choose. However, we call on the Government to do more to assist households in transitioning to alternative energy sources. Not only will this help avoid energy hardship as costs increase, it will better ensure that gas reserves are available for industrial uses, particularly those that have few viable alternatives at present.

11. In addition to energy security, our communities need access to safe and secure low-emission transport options. Public transport in New Zealand's regions plays a crucial role in this. It is not enough to just focus public transport investment in Auckland and Wellington. Work to decarbonise heavy vehicle, aviation and maritime transport is also important. We reiterate the need to create an enabling environment for innovation in these industries, particularly power to X technologies like green hydrogen. Along with improving EV charging infrastructure, we also urge more be done to support the electrification of private vehicles.

12. Finally, we agree that the Government should further investigate improvements to organic waste disposal and landfill gas capture. User up-take of organic waste collection schemes remains a challenge. A key element of the Government's investigations should be reviewing the compliance tools councils have to support organic waste collection, waste reduction and waste diversion. There is also a potential role for Government to be working with manufacturers to reduce waste in general.

13. The Taranaki Mayoral Forum welcomes this opportunity to inform the development of the second emission reduction plan. We look forward to more detailed conversations with the Government on the role Taranaki can play in reaching our emissions targets.

This submission is endorsed by:

Mayor Neil Volzke (Forum Chair)
Stratford District Council

Mayor Phil Nixon
South Taranaki District Council

Mayor Neil Holdom
New Plymouth District Council

Charlotte Littlewood
Taranaki Regional Council Chairperson

Consultation at a glance

New Zealand's second emissions reduction plan

2026–30

Ministry for the Environment
Manatū Mō Te Taiao

Te Kāwanatanga o Aotearoa
New Zealand Government

Preparing for a world impacted by climate change

Households, businesses and our economy are already feeling the effects of a changing climate. We see how heavier rain and flooding during storms threaten the lives and livelihoods of New Zealanders, or how droughts affect our productivity. That's why we need to work together to reduce the impacts of climate change.

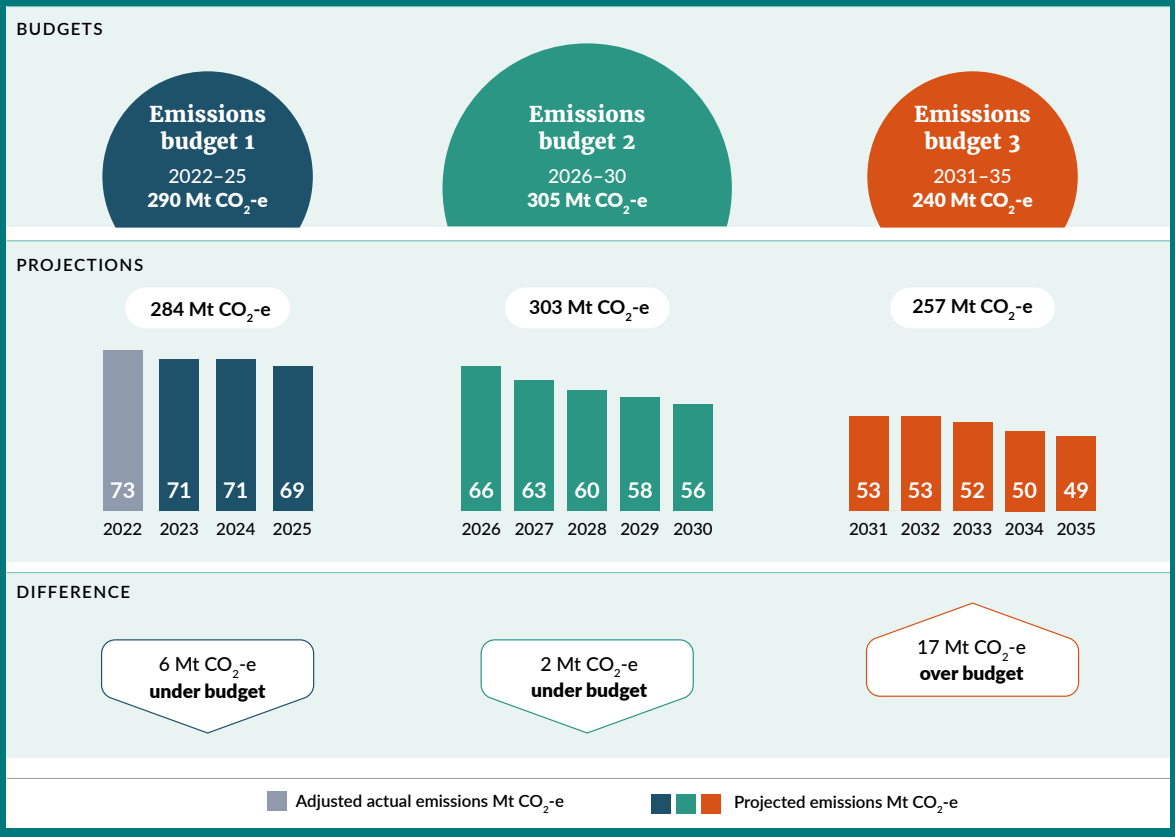
Actions like driving a low-emissions vehicle or switching to renewable energy sources to manufacture products all contribute to lowering our emissions.

Responding to climate change is challenging but it can also create opportunities. We can fuel transport with clean energy and use technology and innovation to drive low-emissions agriculture. We can also support forestry to play its part in reducing the amount of carbon in our atmosphere.

Staying on track to meet our first two emissions budgets is one of the Government's nine public service targets. However, the Government can't get there alone – households, businesses and communities will make the critical difference to our journey.

"We are confident we can achieve and sustain our target of net zero emissions by 2050, but we need a clear plan focused on impactful actions. Our success will rely on our ability to sustainably transition to a low-emissions economy."

Hon Simon Watts
Minister of Climate Change



Current estimates give confidence that emissions budgets 1 and 2 can be achieved. There is greater uncertainty about our ability to meet emissions budget 3, which will be the focus of a third emissions reduction plan in 2030.

The Government's climate response

The Government will meet its targets to reduce the impact of climate change and prepare for its future effects, focusing on five pillars:

- **Infrastructure is resilient and communities are well prepared**
- **Credible markets support the climate transition**
- **Clean energy is abundant and affordable**
- **World-leading climate innovation boosts the economy**
- **Nature-based solutions address climate change**

What this means for New Zealanders:

- Our communities and properties are protected against climate change.
- People are able to heat their homes affordably with more renewable energy available.
- Our economy is thriving, with more and better jobs available.
- Businesses are encouraged to switch to clean energy.
- Businesses have more options available to reduce the impact of their emissions.
- New technologies help to lower agricultural emissions.

The Zero Carbon Framework was set up in 2019 to help New Zealand develop and implement clear climate change policies

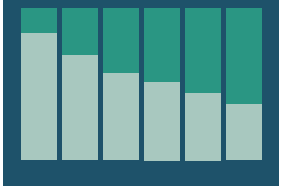
Emissions reduction targets

By 2050:
Long-lived greenhouse gas emissions are net zero

Biogenic methane emissions are 24–47% below 2017 levels

Emissions budgets

Interim targets that step towards 2050



Emissions reduction plans

The policies and strategies to achieve the emissions budgets

Adaptation measures

National adaptation plans and proposed adaptation framework

Turning our priorities into action

The second emissions reduction plan is a key tool to bring this Government's strategy for responding to climate change to life.

The second emissions reduction plan will be published at the end of 2024. This plan will outline the actions that we intend to take to reduce emissions in New Zealand during the second half of this decade. This will help make sure we meet our emissions budget and stay on track to reach the 2050 net zero target.

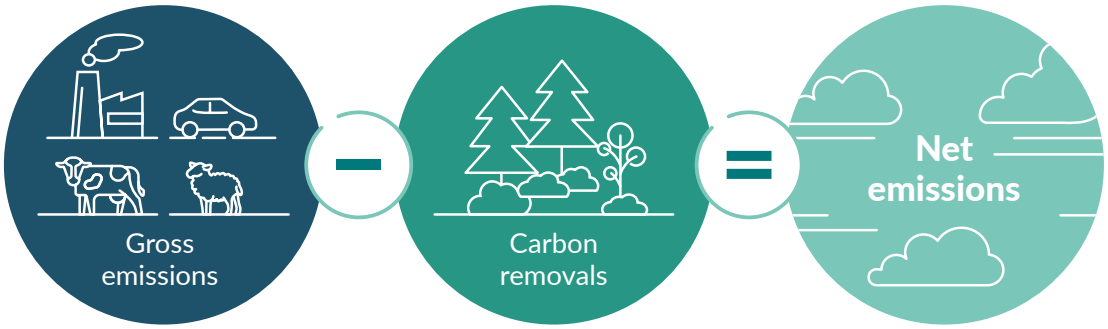
The second emissions reduction plan focuses on sectors that are the key drivers of emissions – energy, transport, agriculture, forestry and waste.

The actions in the second emissions reduction plan have been guided by two principles:

1. **We will remove barriers to enable rapid investment in a climate response that also grows our economy and increases productivity (a 'least-cost' transition).**

   This approach means we will focus on activities that benefit both our climate and our economy, making sure the choices we make are effective, efficient and flexible enough to support us on our journey while enabling New Zealand to continue to thrive.

2. **We will meet our targets by a mixture of actions that reduce our overall emissions, alongside activities that remove greenhouse gases from the atmosphere (a 'net-based' approach).**



Using targets that are focused on 'net emissions' means we will balance the amount of greenhouse gases we produce with activities that take those emissions out of the atmosphere to reach our overall targets. This gives us more options to meet our targets and lets us take advantage of our unique landscape which enables activities that remove greenhouse gases from the atmosphere, such as growing trees.

Key actions to drive emissions reductions

Our second emissions reduction plan will outline actions within the Government's five pillars and across multiple sectors. Within those actions, there are seven key policies that could have the greatest impact on our ability to meet our targets.

= Expected maximum emissions savings in second emissions budget period (Mt CO_2-e)

= Expected maximum emissions savings in third emissions budget period (Mt CO_2-e)

Policies to reduce emissions across five sectors

The second emissions reduction plan will identify targeted actions to reduce our emissions across five key sectors. Focusing on the sectors that produce the most emissions ensures that our response is coordinated across the whole economy. That coordination will help to make sure that we reduce emissions in a cost-effective and efficient way.

Energy

What we're doing now

- Enabling accelerated investment in renewable energy generation and electricity networks by improving the resource management system.
- Enabling carbon capture technology.

What's coming

- Doubling renewable energy by 2050.
- A smarter electricity system which gives New Zealanders the ability to change how and when they use power.

What this could mean for New Zealanders

- In the long term, households can heat their homes more affordably, with renewable energy.
- People charge their electric vehicles easily across the country.
- Renewable energy providers have confidence to invest, enabling them to grow their operations and meet increasing demand.

The kinds of questions you might see

- What barriers are there to business investing in renewable electricity supply?
- How can the Government support business to take up low-emissions fuels and carbon-capture technology?

Transport

What we're doing now

- Working with Sustainable Aviation Aotearoa, which is a group of private sector and government agencies supporting the decarbonisation of the aviation sector.

What's coming

- Enabling a network of 10,000 public electric vehicle (EV) charging points by 2030 and facilitating private investment in EV charging infrastructure, subject to a cost–benefit analysis.
- Reviewing regulatory barriers to zero-emissions heavy vehicle uptake.
- Working with other countries on sustainable aviation fuels and low- and zero-carbon shipping on key trade routes by 2035.
- Supporting public transport in key areas.

What this could mean for New Zealanders

- People can easily charge their electric vehicles wherever they are in New Zealand.
- There are fewer barriers to using zero-emissions heavy vehicles in New Zealand.
- Reliable and accessible public transport in our main cities encourages efficient use of our infrastructure and supports our emissions goals.

The kinds of questions you might see

- How can the Government enable more public EV charging infrastructure?
- What are the three main things the Government can do to make it easier to switch to low- and zero-emissions heavy vehicles?

Agriculture

What we're doing now	▸ Reviewing methane science and target. ▸ Accelerating the development of tools and technologies to reduce on-farm emissions. ▸ Developing on-farm emissions measurement for implementation by 2025.
What's coming	▸ Recognising more on-farm activities that remove greenhouse gases from the atmosphere. ▸ Implementing a fair and sustainable pricing system for agricultural emissions by 2030. ▸ Accelerating the development and commercialisation of emissions-reduction tools and technologies.
What this could mean for New Zealanders	▸ Our farmers and growers are thriving, producing high-value products while creating fewer emissions. ▸ Farmers and growers have access to new technologies that support emissions reductions without reducing production.
The kinds of questions you might see	▸ How can the Government support farm/industry-led action to reduce emissions? ▸ How can farmer uptake of emissions-reductions tools be encouraged?

Forestry and wood processing

What we're doing now

- Restoring confidence and credibility in the New Zealand Emissions Trading Scheme to give certainty to the market.

What's coming

- Managing on-farm conversions to forestry through the New Zealand Emissions Trading Scheme.
- Boosting wood processing by improving the consenting framework, supporting commercial investments, and getting the system settings right to be building with wood.

What this could mean for New Zealanders

- Our most valuable and productive farmland is protected, so that we're able to produce food and other goods.

The kinds of questions you might see

- What could the Government do to help streamline consents for wood processing?
- What other opportunities are there to reduce emissions in forestry and wood processing?

Waste

What we're doing now

- Incentivising efficient landfill gas capture through the New Zealand Emissions Trading Scheme.
- Investing a portion of the waste disposal levy into New Zealand's waste infrastructure.

What's coming

- Targeting further investment in New Zealand's resource recovery infrastructure and systems (including construction and demolition waste).
- Investigating improvements to organic waste disposal and landfill gas capture.

What this could mean for New Zealanders

- Waste-related biogenic methane emissions are further reduced.
- More reusable and recyclable resources are available, to be used in the New Zealand economy.

The kinds of questions you might see

- What is the main barrier to reducing emissions from waste in households, businesses or across the sector?
- What is the key action (or actions) the Government could take to support the waste sector to produce fewer emissions?

Other policies to shift the dial

As well as sector-based strategies, the second emissions reduction plan will consider other areas that are critical to meeting our emissions budgets.

	What does this section cover?	Questions you might see
Strengthening the New Zealand Emissions Trading Scheme (NZ ETS)	How the Government intends to strengthen the NZ ETS to support New Zealand to achieve the second emissions budget and longer-term climate change targets.	▶ What are the other main ways the Government could use the NZ ETS to reduce net emissions? ▶ What are the three main risks of using the NZ ETS as a key lever to reduce net emissions?
Non-forestry removals	Opportunities for New Zealand to take advantage of its natural abundance to remove emissions in other ways, such as wetland restoration.	▶ What are the three main opportunities and barriers for non-forestry removals? ▶ How should we balance recognising the role of non-forestry removals with ensuring landowners have flexibility for managing their own land?
Sustainable finance: How we fund and finance climate mitigation	To achieve our targets, we will need the private sector to invest in new technologies and tools that support the climate response.	▶ What are the barriers to investing in activities that support our climate response? ▶ What can the Government do to remove those barriers?
Adaptation: Helping sectors adapt to the impacts of a changing climate	Sectors need to consider how they manage the impacts of climate change. This will help to ensure the changes they make to reduce emissions also have a positive impact on our resilience.	▶ What are the barriers that sectors face when managing or planning for climate risks?
Distributional impacts: Understanding the impacts that policies will have on communities	Some changes that are made as part of our transition to a low-emissions economy will be challenging and may impact communities in different ways. We need to understand these impacts as part of our policy development.	▶ What are the main impacts that the proposed changes will have on your community? ▶ Should the Government consider climate-specific support services or programmes over the coming years?

Join the conversation and have your say

This consultation starts on 17 July 2024 and ends on 21 August 2024.

After that, the government agencies working on the emissions reduction plan will review submissions and will include their findings in advice to Ministers. A summary of submissions will support Cabinet decisions on the second emission reduction plan, which will published by the end of 2024.

- @environmentgovtnz
- @environmentgvnz
- facebook.com/environmentgovtnz
- linkedin.com/company/environmentgovtnz

Help shape the emissions reduction plan

We have released two documents to help New Zealanders understand the draft proposals for the second emissions reduction plan.

Read the discussion document to learn more about sector proposals for the second emissions reduction plan, as well as how these policies might affect different groups of people and how communities can respond to the effects of climate change.

Read the technical annex to understand the modelling and supporting information for the proposals.

Register for online events and hui and learn more about the proposal on our website.

How to make a submission

The most effective way to make a submission is through our online form. If you have any questions about making a submission or need to send a written submission, contact us at:

ERPConsultation@mfe.govt.nz

ERP2, Ministry for the Environment
PO Box 10362
Wellington 6143

Submissions close at 11:59pm on 21 August 2024.

Ministry for the Environment
Manatū Mō Te Taiao

Te Kāwanatanga o Aotearoa
New Zealand Government

Published by the Ministry for the Environment | Manatū mō te Taiao in July 2024

INFO 1257

Whakataka te hau

Karakia to open and close meetings

Whakataka te hau ki te uru	Cease the winds from the west
Whakataka te hau ki te tonga	Cease the winds from the south
Kia mākinakina ki uta	Let the breeze blow over the land
Kia mātaratara ki tai	Let the breeze blow over the ocean
Kia hī ake ana te atakura	Let the red-tipped dawn come with a sharpened air
He tio, he huka, he hauhu	A touch of frost, a promise of glorious day
Tūturu o whiti whakamaua kia tina.	Let there be certainty
Tina!	Secure it!
Hui ē! Tāiki ē!	Draw together! Affirm!

Nau mai e ngā hua

Karakia for kai

Nau mai e ngā hua	Welcome the gifts of food
o te wao	from the sacred forests
o te ngakina	from the cultivated gardens
o te wai tai	from the sea
o te wai Māori	from the fresh waters
Nā Tāne	The food of Tāne
Nā Rongo	of Rongo
Nā Tangaroa	of Tangaroa
Nā Maru	of Maru
Ko Ranginui e tū iho nei	I acknowledge Ranginui above and Papatūānuku
Ko Papatūānuku e takoto ake nei	below
Tūturu o whiti whakamaua kia	Let there be certainty
tina	Secure it!
Tina! Hui e! Taiki e!	Draw together! Affirm!

AGENDA AUTHORISATION

Agenda for the Policy and Planning Committee meeting held on Tuesday 3 September 2024

Confirmed:

23 Aug, 2024 3:37:38 PM GMT+12

A D McLay

Director Resource Management

Approved:

26 Aug, 2024 3:07:24 PM GMT+12

S J Ruru

Chief Executive