

## Submission on Clean Water Package 2017

**Send to:** [watercomments@mfe.govt.nz](mailto:watercomments@mfe.govt.nz)  
**Submitter:** Cawthron Institute (Cawthron)  
**Address:** Private Bag 2  
98 Halifax Street East  
Nelson 7042  
New Zealand  
**Phone:** [REDACTED]  
**E-mail:** [info@cawthron.org.nz](mailto:info@cawthron.org.nz)

The Cawthron Institute is New Zealand's largest independent science organisation, offering a broad spectrum of services to help protect the environment and support sustainable development of primary industries. Based in the Nelson region, we work with regional councils, government departments, major industries, private companies, and other research organisations throughout New Zealand and around the world.

Given the pressures currently on our freshwater ecosystems we are pleased to see further reforms proposed to improve freshwater management. We have several comments on the proposed changes which are listed below.

### **A time-based approach to swimmability assessment**

We support the concept of a time-based approach to categorising waters in terms of their suitability for swimming. This approach recognises that the risk of swimming, or other primary contact with the water, will vary over time with most waterways being safe for swimming at times and not safe at other times. We believe that this is an important message for the public to understand. It also emphasises the need for better understanding of the factors affecting swimming risk so guidance can be provided on whether a site is safe to swim on a particular day. At the moment, the most up-to-date information can only say whether a site was safe for swimming several days previously – and conditions may have changed since then. A move towards predictive assessments of risk will be a big step forward.

### **Multiple factors affect swimming**

In the consultation document swimmability of rivers is based solely on levels of *E. coli*, and does not consider toxic cyanobacteria. This is due to a lack of robust datasets on cyanobacterial blooms in New Zealand rivers and is an acknowledgement that there are still gaps in our knowledge as to why blooms occur and why they have increased in abundance. There is a risk that, although a site might be swimmable based on *E. coli* levels, swimming should not occur due to toxic cyanobacterial blooms. Additionally while we encourage all actions to reduce *E. coli* concentrations and improve freshwater quality, there is a possibility that in some rivers these actions might not reduce cyanobacterial blooms. Further research is urgently needed to increase knowledge on why benthic cyanobacterial blooms form and to identify actions that can be taken to reduce them.

### **More information is needed on the definition of the 'Quality for swimming' categories**

The proposed attribute table for human health and recreation (page 39 of Annex 1 to the consultation document) currently includes only the percentage of time for exceedance of 540 *E.coli* per 100ml. We consider it is important that this table should also include the other information

apparently used to categorise suitability of rivers for swimming. According to information on the MfE website<sup>i</sup> all rivers categorised as swimmable (i.e. Blue, Green, Yellow classes) must have a median of  $\leq 130$  *E. coli* per 100 ml, in addition to other category specific percentile exceedance criteria. Inclusion of this median criterion in the attribute table, in particular, would more accurately reflect the intended risk profile targets tabulated on the MfE website.

#### **Additional flow-related criteria to help public make informed risk assessment**

We also suggest an additional criterion is added to the attribute table for Human health for recreation relating to ensuring that *E. coli* levels are consistently low during periods of low to moderate flow, when people are most likely to go swimming. For example, no exceedances of the 130 *E. coli* per 100 ml criterion allowed in samples taken at flows below the median flow.

This would help the public make a more informed risk assessment of flow conditions when it is likely to be safe to swim and times when it would be prudent to seek further information before going into the water.

While the MfE website provides useful information on websites that people can check to see if it is safe to swim in their local rivers and lakes (e.g. LAWA), it is not realistic to expect people (particularly children) to check these websites every time they intend to go swimming. Furthermore, the *E. coli* monitoring information is not updated in real time, so conditions may have changed since the last monitoring occasion.

Clearly identifying a flow range which is more likely to be safe for swimming would empower people to decide when it is likely to be safe to swim.

#### **Standards should also apply to smaller order streams and small lakes**

We are concerned that the proposed addition of Objective A3 to the NPS-FM appears to exclude consideration of smaller streams and lakes for human contact. People engage in recreational activities that bring them into contact with water in smaller rivers and lakes, including possible immersion.

With the proposed changes there appears to be no requirement for Councils to categorise the human health risk of contact with smaller waterbodies, whereas previously at least the secondary contact criteria would have applied.

Protection of smaller rivers and streams is perhaps inferred given the need for good water quality in contributing tributaries so that swimmability in downstream rivers, lakes and estuaries can be achieved. However, the maps of water quality for swimming in the consultation document clearly illustrate that managing the water quality of larger rivers does not ensure that tributaries are also looked after. There are a large number of cases where tributaries are categorised as lower quality for swimming than the larger rivers they flow into. We suggest that the new categories of risk to human health from immersion (page 39 of Annex 1 to the discussion document) be extended to also apply to smaller rivers and lakes.

#### **Data limitations in lakes**

Currently swimmability of lakes is based on cyanobacterial biovolumes – yet for most lakes in New Zealand these data are lacking, yet the current swimming maps are largely based on modelled data. For example, there are data on cyanobacterial concentrations for only three lakes in the entire South

Island. There are approximately 3800 (>1 ha) lakes in New Zealand, yet we have robust water quality data for fewer than 200 of these (approx. 5 %).

*E. coli* also poses a risk to humans in lakes, but as the datasets are so limited, they could not be included in the current assessment of lake swimmability. This knowledge gap needs to be addressed.

There are also severe scientific biases among existing lake datasets. For example, most monitored lakes are in highly modified catchments and warmer regions, and oligotrophic high altitude lakes are not monitored. This means that current modelled predictions are not accurate.

It is going to be challenging for the government to quantitatively measure improvements in the swimmability of New Zealand lakes when the predictions of swimmability are based on such limited and biased datasets. We recommend that more effort is put into lake monitoring around the country. In relation to swimmability, measurement of both cyanobacteria and *E. coli* is required. This additional monitoring needs to cover a representative selection of lake types, including some oligotrophic high altitude lakes. Additional monitoring will provide better data on many NZ lakes, and also improve our ability to undertake predictive modelling for the remaining lakes.

### **Timeframes**

We consider that the long timeframe for delivery of the target of ensuring 90% of rivers and lakes are swimmable by 2040 – that is, 23 years from now – needs to be reconsidered and brought forward. The slow pace of change proposed in delivering swimmability may actually allow prevarication and worsening of river and lake conditions before they improve, as most of the large costs for remediation actions are more likely to be deferred past 2030.

The assessment of costs and impacts on communities undertaken by regional councils in 2018 will provide information on the ability of regional councils to implement the target and this should be based on a revised target date of 2025. Any council that considers it is not practicable to achieve the target by 2025 could be required to apply to the Minister of the Environment for an exemption for a specified period.

The current long timeframe for delivery of improvements to our rivers and lakes defers the bulk of the remediation costs onto the next generation. Those costs are likely to escalate the longer we leave river and lake health in poor quality – and to include secondary costs on human health, biodiversity health and losses in tourism revenue. The bulk of the cost burden should fall on today's polluters who largely benefit from 'free externalities'. Where regional communities are expected to contribute, then addressing inter-regional equity (e.g., in upgrading ageing wastewater treatment infrastructure) should be considered.

### **Integrated management**

Cawthron supports the proposed amendments to Policy C1 to further emphasise the interactions between freshwater, land and coastal ecosystems. It is critical that a ki uta ki tai approach is used to recognise these connections.

### **Clarification regarding overall quality**

The proposed change to Objective A2 which specifies that overall quality is maintained or improved within a freshwater management unit is a small improvement. However, if the word 'overall' is to be retained then much more guidance is required on how overall should be interpreted. For example,

how would a decline in dissolved oxygen concentrations be weighed against an improvement in phosphorus concentrations?

### **Macroinvertebrates as a monitoring tool**

We support the recommended amendment to Objective CB1 that adds a new requirement (aa) to establish “methods for monitoring the extent to which the values identified under Part CA2(b) are being provided for in a freshwater management unit”.

We consider the amendment to require “ii. the monitoring of macroinvertebrate communities” to be a positive change to ensure better monitoring of values for which there are currently no attributes. We suggest that current and future research on macroinvertebrate metrics (and their suitability to act as either performance standards and or attributes) is carefully considered when providing councils with guidance on how to implement this amendment.

### **Maximum nitrogen and phosphorus concentrations to control periphyton**

The addition of the note at the bottom of the periphyton attribute table helps to recognise the important role that nutrient concentrations play in driving periphyton proliferations and the need to set maximum nutrient concentrations to control these proliferations. However, the use of a note seems inconsistent with the approach used for lakes where separate attributes for phytoplankton and nutrients are included in the NOF.

We consider that the nitrate toxicity attribute should apply in rivers that support periphyton growth, but recognise that lower nitrate concentrations than those outlined in the nitrate toxicity attribute will be required to help control periphyton growth.

### **Stock exclusion rules**

Cawthron supports the proposal to establish national regulations to describe requirements for exclusion of stock from waterways. Stock in waterways contribute significantly to bacterial contamination and also cause significant damage to the banks and beds of streams, rivers, lakes, wetlands and estuaries. Stock access to waterways results in increased sediment loads and reduced riparian vegetation, causing a range of adverse effects on aquatic ecosystems and human uses and values.

We recommend four changes that would improve the proposed regulations on stock exclusion.

#### *Default width for the riparian buffer*

1. The regulations should specify a default width for the riparian buffer area from which stock must be excluded. Given the current wording, the default is for no buffer strip at all, which is not consistent with scientific studies showing the importance of riparian areas (Quinn 2000).

We recognise that the same width will not be appropriate for all waterways. Research by Cawthron scientists has shown that a vegetated buffer of five metres on each bank of lowland streams generates significant benefits (Holmes et al. 2016). In some cases, a wider buffer might be required on steeper slopes to intercept runoff of greater velocity. With a default width, regional councils would be allowed to specify a greater or lesser width via rules in their regional plans, provided that any requirements are consistent with achieving water quality and aquatic health standards of the NPSFM and the regional plan itself. This would ensure that most

waterways get the benefit of some protection, while allowing councils to adjust the width as appropriate to the circumstances.

Based on our research, we recommend a default width of 5 metres for the riparian margin from which stock must be excluded.

### *Sheep*

2. The proposal establishes no requirements for exclusion of sheep from waterways. While sheep in steep country are almost always at low density and therefore not of concern, this is not the case in rolling country and plains. Recent work by Cawthron scientists has shown that sheep can cause significant damage when they have concentrated access to waterways (Holmes & Goodwin 2016).

We recommend that except on steep country, sheep be subject to the same rules as beef cattle: excluded from waterways on rolling land (3°-15°) by 1 July 2030 and from waterways on plains (<3°) by 1 July 2025.

### *Strip-grazing*

3. The proposal indicates that, where strip-grazing is undertaken, dairy support cattle, beef cattle and deer would need to be excluded from water bodies by 1 July 2022. Strip-grazing can generate a significant amount of damage to water bodies. It typically occurs on flat land where sediment, once it enters a stream bed, may never get flushed out, effectively causing irreversible damage. Given that temporary fencing is being used anyway, an additional line of fence can be used to exclude stock from a waterway, and this can be done almost immediately.

We recommend that, in the case of strip-grazing, the deadline for stock exclusion be 1 July 2017 rather than 1 July 2022, and that this apply to sheep as well as all cattle and deer.

### *Stock crossings*

4. The proposal states that stock crossings that are used once or more per week must be bridged or culverted by 1 July 2019. We recommend guidance to landowners indicating that culverts need to be carefully designed to avoid creating barriers to fish passage, and that resource consents are typically required.

## **References**

- Quinn JM 2000. Effects of pastoral development. In: Collier, K. J., Winterbourn, M. J. (Eds) 'New Zealand Stream Invertebrates: Ecology and Implications for Management.' (New Zealand Limnological Society, Christchurch.) 415 p.
- Holmes R, Hayes J, Matthaei C, Closs G, Williams M, Goodwin E 2016. Riparian management affects instream habitat condition in a dairy stream catchment. *New Zealand Journal of Marine and Freshwater Research*. 4: 581-599.
- Holmes R, Goodwin E 2016. Effects of varying riparian management practices on instream habitat in Waituna Creek—implications for management. Prepared for Department of Conservation and Fonterra Wetland Restoration Partnership. Cawthron Report No. 2797. 38 p.

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<sup>i</sup> <http://www.mfe.govt.nz/fresh-water/freshwater-management-reforms/water-quality-swimming-categories-attribute-states-detail>