Freshwater Quality Monitoring

Based on Environmental Publication 2018/10

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Bay of Plenty Regional Council currently tests 55 rivers and 12 lakes across the region regularly, to see how healthy they are. Council uses a broad range of indicators (attributes) to check and manage water quality, including:

- **Chlorophyll-a –** a measure of algal growth.

- **Total nitrogen and total phosphorus** – nutrients that can drive algal growth.

- **Nitrate** – a nutrient included in the National Policy Statement for Freshwater Management (NPS-FM) as an attribute that must be monitored to manage toxicity effects on aquatic life.

- **Ammoniacal- nitrogen** – like nitrate, this is included in the NPS-FM as an attribute to manage toxicity effects on aquatic life.

- **Dissolved oxygen** – measured below point source discharges and a key indicator of habitat suitability for aquatic life.

- **Water temperature** – like dissolved oxygen, this is a key indicator of habitat suitability and an attribute for aquatic life.

- **Planktonic (floating) or benthic (riverbed) cyanobacteria** – also known as blue/green algae. It can produce blooms that are potentially toxic to people or animals that come into contact with it. Planktonic cyanobacteria is included in the NPS-FM as an attribute to manage effects on human health.

- **Escherichia coli (*E. coli*)** – A type of bacteria commonly found in the guts and faeces of warm-blooded mammals (including people) and birds. It's a swimmability measure and often an indicator that disease-causing viruses and pathogens may be present in fresh water. *E. coli* is included in the NPS-FM as an attribute to manage effects on human health.

- **Freshwater invertebrates (Macroinvertebrate Community Index)** – freshwater invertebrates include insects, worms and snails – all of which play a significant role in a healthy river.

- **Trophic Level Index (TLI)** – uses multiple water quality parameters to give an overall picture of the health of Bay of Plenty lakes.

- **Periphyton** is the slime that grows attached to rocks, stumps, and other stable substrates in rivers and streams. It is composed mostly of algae, although it can also contain fungi and bacteria.

This snapshot provides a summary of the findings of recent water quality monitoring data across these different indicators. Gradings from 'very good' to 'poor' are given to each monitoring site and/or indicator, based on monitoring observations and water sample test results.

Lake Rotomā, Rotorua

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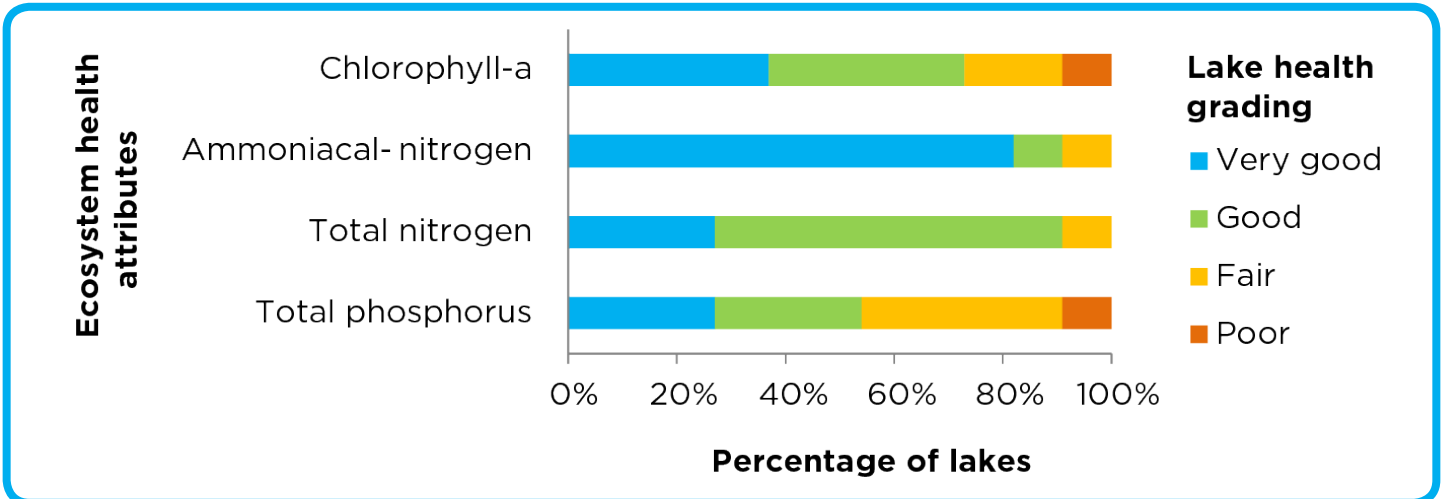**BAY OF PLENTY REGIONAL COUNCIL TOI MOANA**

Lake health

Figure 1. Percentage of lakes in the Bay of Plenty Region graded as having very good, good, fair or poor water quality.

Lakes graded as 'poor' in Figure 1 include:

- **Lake Rotomahana** which does not meet the national bottom line[1] for total phosphorus and has retained this state for the past three years. At this level, ecological communities in lakes are at high risk of excessive plant growth and algal blooms.

- **Lake Ōkaro** does not meet the national bottom line for chlorophyll-a. At this level, lake ecological communities are moderately impacted by plant and algal growth.

Water quality at all other lake monitoring sites was found to be better than the national bottom line for total nitrogen, phosphorus, ammoniacal-nitrogen, chlorophyll-a (phytoplankton[2]). Five of the 12 Rotorua Te Arawa Lakes meet or are better than the TLI targets set for them.

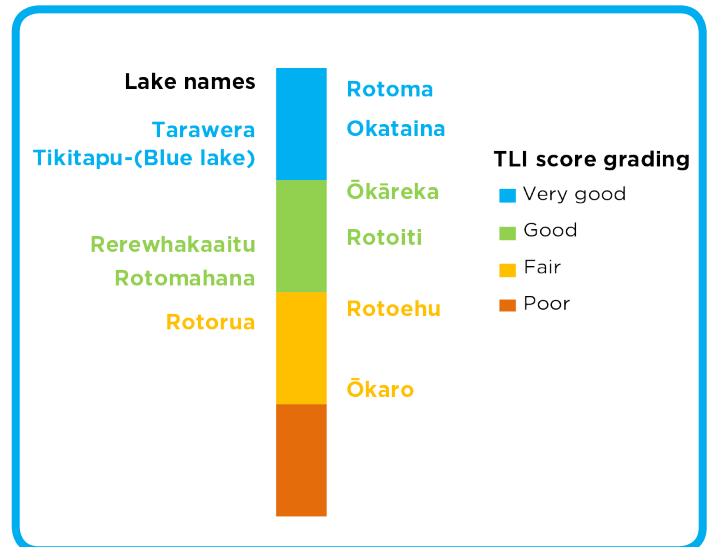

Gemma Kerrisk, Algal Monitoring Technician

Figure 2. Trophic Level Index (TLI) grading for monitored Bay of Plenty lakes.

[1] Lake attributes graded 'poor' are below the 'National Bottom Line' set in the NPS-FM.
[2] Phytoplankton are microscopic algae found in lakes.

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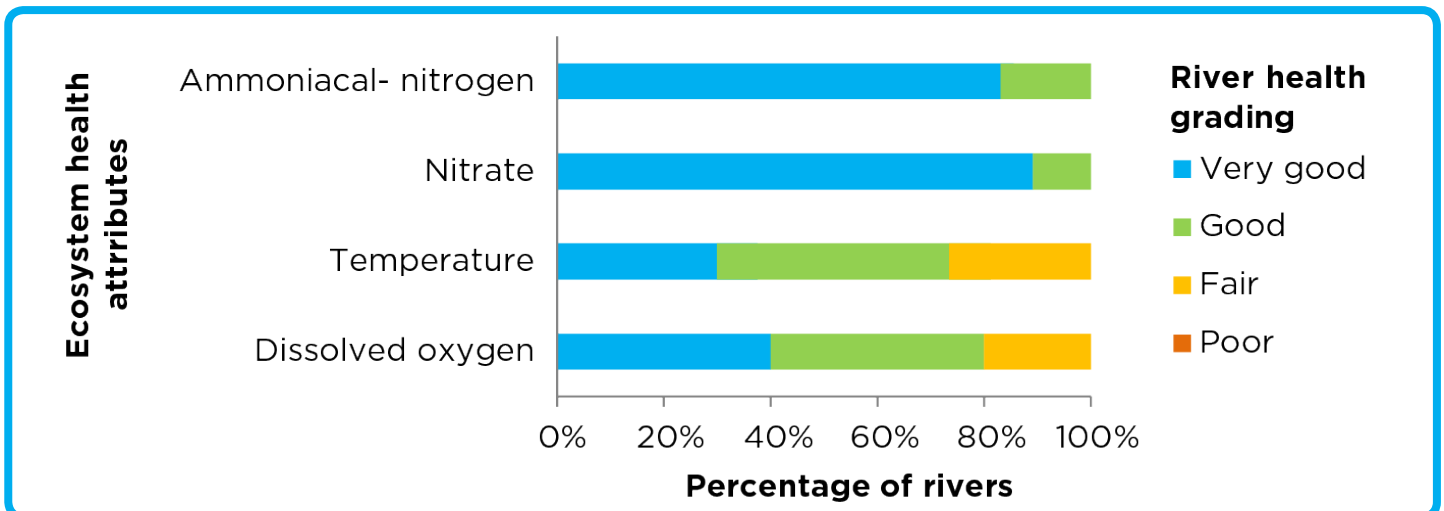TOI MOANA

River health

Figure 3. Percentage of sampling sites on rivers in the Bay of Plenty region with water quality parameters graded as very good, good, fair or poor.

- All river monitoring sites were graded in the 'very good' or 'good' bands for nitrate and ammoniacal-nitrogen. Nitrogen in the 'good' grade can start to impact the growth of some sensitive fish and invertebrates. Note that this grading is based on acceptable levels for aquatic life. Nitrogen can also promote the growth of periphyton (river slime) and may need to be managed to lower levels in some places, to protect other waterway values.

- Four sites (Rangitāiki, Tarawera and Kaituna River and Waiari Stream) were graded in the 'very good' or 'good' bands for dissolved oxygen, indicating that there is enough oxygen in the water for fish to survive. One site (Rangitāiki River) was graded fair, which indicates that lower oxygen levels are placing moderate stress on aquatic animals in that river.

- More than 70 percent of the rivers that have been monitored for water temperature, sit within the highest two bands ('very good' and 'good') for this attribute, indicating that the water temperature stays cool enough for the animals that live in the water and does not get too hot in summer. Four sites were graded in the 'fair' band for the 2017/18 summer.

Periphyton (river slime):

- Of the 29 rivers monitored for periphyton, 66 percent were graded as 'very good' for periphyton, and had consistently low chlorophyll-a algal biomass; this means there is not much slime on the bottom of the river.

- A further 28 percent of rivers were in the 'good' grade, suggesting only short-lived blooms of relatively low biomass are occurring in those rivers. Only seven percent of sites (Tuapiro at farm bridge and Waitekohe at SH2) were in the 'fair' grade, where periodic short-duration algae blooms occurred. No sites were graded in the poor band.
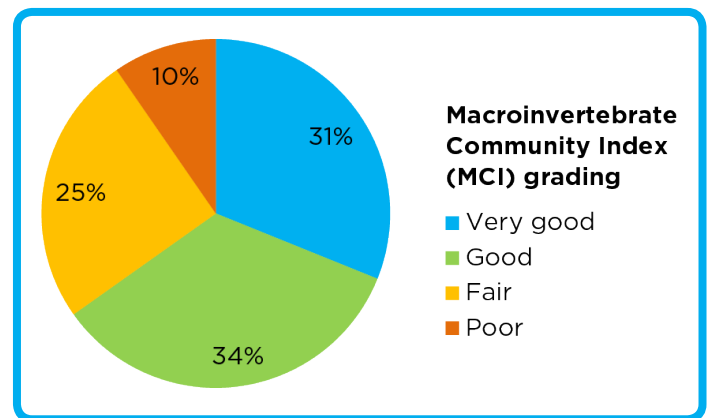
Freshwater invertebrates:

Figure 4. Percentage of river monitoring sites in the Bay of Plenty region categorised into different MCI bands (very good, good, fair, poor).

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Suitability for recreation

Lake swimmability

- All lakes were graded as 'swimmable' based on the levels of *E. coli* bacteria present throughout the 2017/18 summer, and were in the 'very good' or 'good' band.

- Cyanobacteria (blue-green algae) blooms in Lake Rotoehu and Lake Ōkaro increased the health risk for people who came into contact with the water (such as by swimming or wading in it). Therefore those two lakes were graded as 'fair' for recreational contact over the past two assessment periods (2013-2016, 2014-2017), based on planktonic cyanobacteria bio-volume.
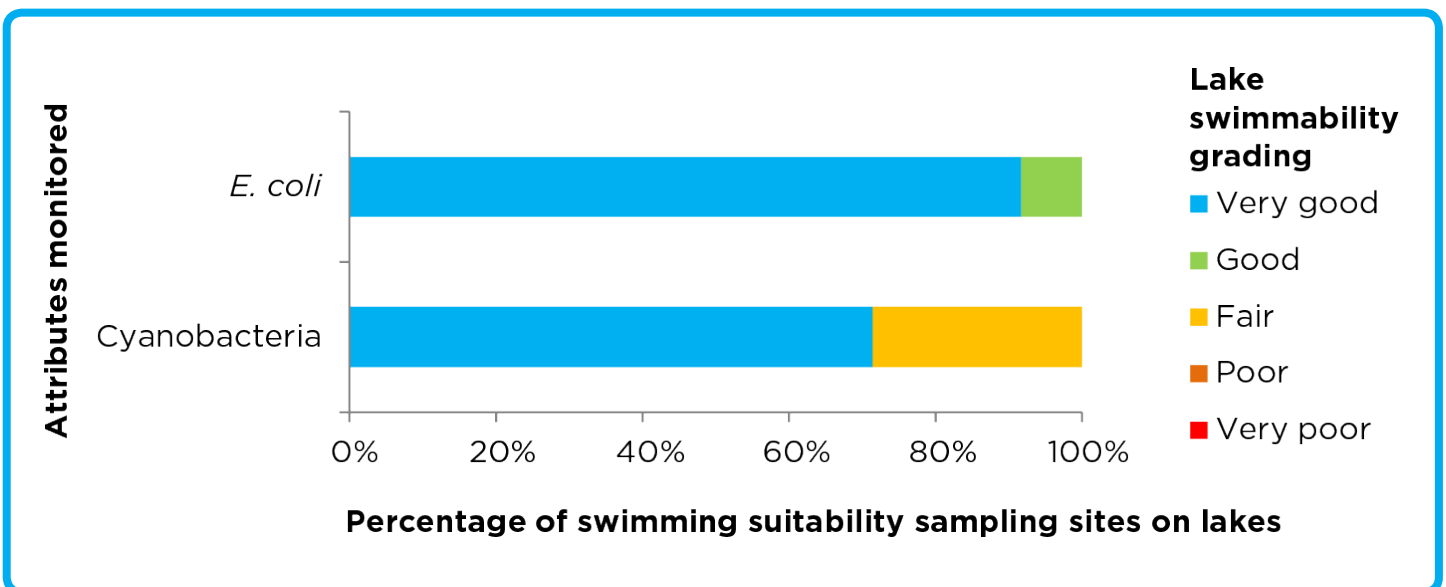

Figure 5. Percentage of sampling sites on Bay of Plenty lakes categorised by grades for E. coli and planktonic (floating) cyanobacteria.

River swimmability

- Nearly three quarters of monitored rivers are graded as 'fair' or better for *E. coli*, indicating that they are suitable for contact recreation.

- Twenty-three percent of monitored river sites are in the 'poor' band for *E. coli*, including Ngongotahā, Utuhina, Waitetī, Kopurererua and Uretara Streams. Those streams, along with Kaiate Stream which is graded 'very poor' band, are not suitable for contact recreation.

- None of the 29 monitored rivers showed any evidence of prolonged or extensive benthic cyanobacterial blooms, and all had cyanobacteria levels that were within the 'very good' grade.
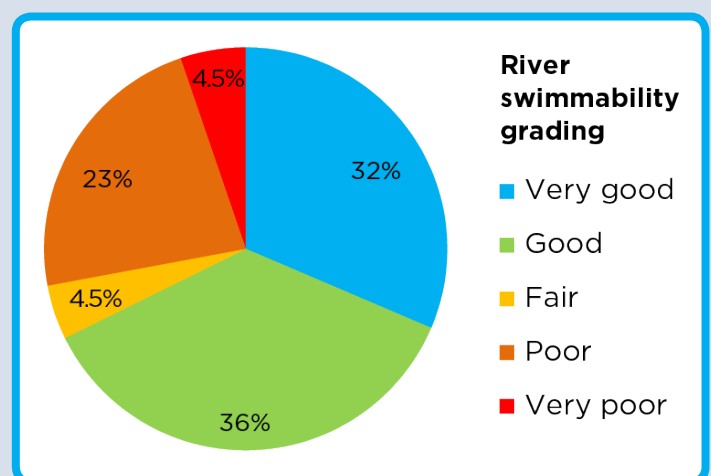

Figure 6. Percentage of sampling sites on Bay of Plenty rivers graded as very good, good, fair, poor or very poor) for swimming suitability based on E. coli bacteria levels.

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See more water monitoring information at www.lawa.org.nz

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