Water quality and ecology of the Rangitāiki catchment

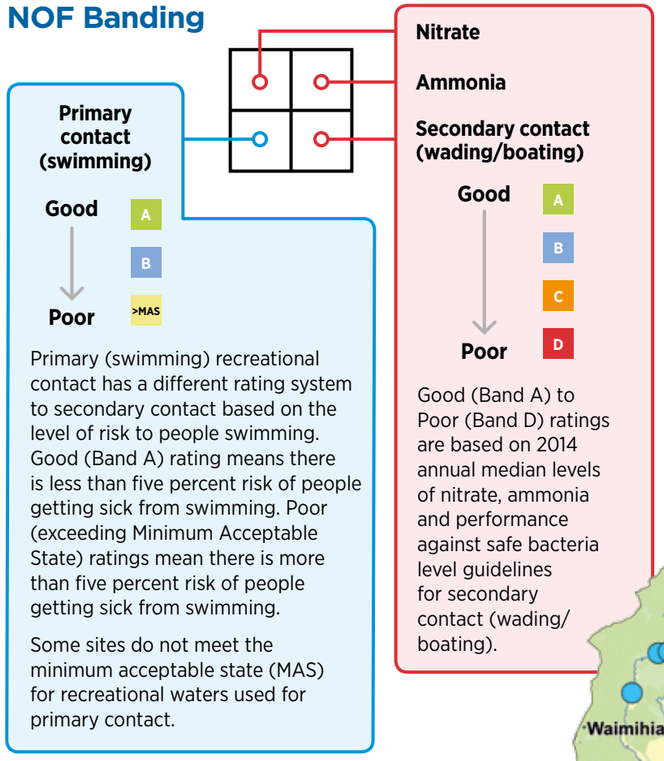
National Objectives Framework (NOF)

The National Policy Statement includes a National Objectives Framework (NOF), which sets compulsory national values for freshwater to protect 'human health for recreation' and 'ecosystem health'.

The NOF has a series of 'bands' ranging from A to D, and National Bottom Lines for the following attributes in rivers:

To protect ecosystem health:	To protect human health for recreation:
• Nitrate • Ammonia	• E.coli • Cyanobacteria

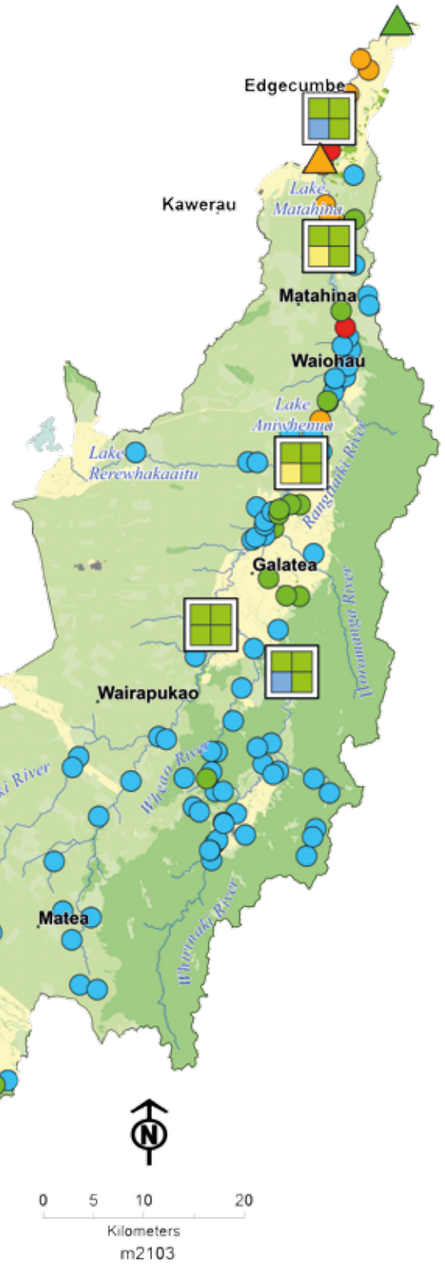
NOF Banding



Primary (swimming) recreational contact has a different rating system to secondary contact based on the level of risk to people swimming. Good (Band A) rating means there is less than five percent risk of people getting sick from swimming. Poor (exceeding Minimum Acceptable State) ratings mean there is more than five percent risk of people getting sick from swimming.

Some sites do not meet the minimum acceptable state (MAS) for recreational waters used for primary contact.

Good (Band A) to Poor (Band D) ratings are based on 2014 annual median levels of nitrate, ammonia and performance against safe bacteria level guidelines for secondary contact (wading/boating).



MCI Class
- Excellent
- Good
- Fair
- Poor

Suitability for Recreation Grade
- Good
- Fair

Land use
- Urban
- Exotic Forest
- Indigenous Forest
- Horticulture
- Pasture

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Rangitāiki River Estuary

At risk from:

- Increasing nutrients
- Unwanted plant and algae growth
- Loss of riparian and whitebait habitat

River estuaries are dynamic environments with large changes in tidal and river flows. About 63 percent of native freshwater fish species use estuaries to swim between fresh and salt water.

Like many river estuaries, the Rangitāiki has little aquatic vegetation or macro-algae.

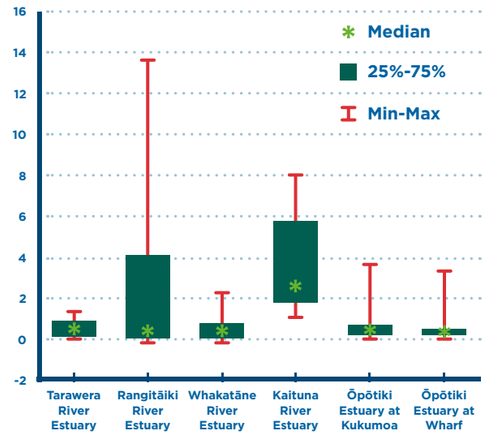
Freshwater usually dominates the water quality of river estuaries. Flood flows and the delivery of sediment and nutrients into estuaries can make it hard for plants and animals to live and grow there.

Phosphorus and nitrogen are increasing in the estuary. Nitrogen is also increasing in the whole catchment, while phosphorus is only increasing in the lower catchment. Discharges and land use influence phosphorus in the lower catchment.

Nutrients can promote excess plant and algae growth. We measure plant and algae growth by measuring the concentrations of chlorophyll-a, the pigment in plants that is used for photosynthesis.

The Rangitāiki Estuary has the highest maximum chlorophyll-a concentrations and the second highest median concentration of all Bay of Plenty river estuaries.

Chlorophyll-a



Lakes Āniwaniwa (Aniwhenua) and Matahina

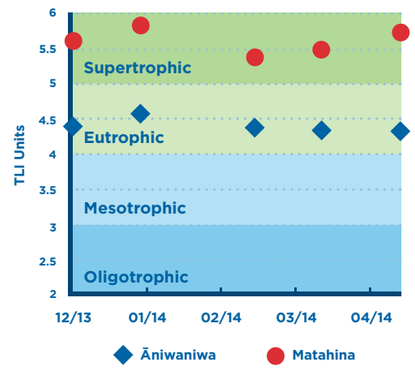
At risk from:

- High nutrient levels causing high algae and macrophyte (aquatic plant) growth
- Exotic macrophytes choking waterways
- Impacts of macrophyte growth on recreation and ecology

We describe the health of lakes using the trophic level index (TLI), calculated using total nitrogen, total phosphorous, water clarity and chlorophyll-a.

TLI results shown below demonstrate that both lakes are nutrient-enriched, and that Lake Āniwaniwa is classed as eutrophic (poor water quality) and Lake Matahina is classed as supertrophic (very poor quality). These lakes often have unsightly scums of algae and floating plants on the water surface, which can lead to decreased animal and plant diversity, and affect recreation.

Trophic Level Index



Macrophytes are important habitats for fish and invertebrates and play a key role in nutrient cycling. They are monitored using a lake health assessment scoring system called the Lake Submerged Plant Indicator (Lake SPI).

Because introduced macrophytes have largely out-competed native species in these two lakes, Lake SPI scores are low. Lake Matahina especially has very few native macrophytes left, and is dominated by exotic species. See Lake SPI scores in the table below.

	Lake Āniwaniwa	Lake Matahina
Lake SPI Condition %	12%	10%
	Poor ⟷ Good	Poor ⟷ Good

For more information

Visit www.boprc.govt.nz/rangitaiki
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Freshwater is essential to life; it sustains the things we value

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Coastal and freshwater recreation monitoring

Water contaminated by human or animal faeces can contain disease-causing bacteria, viruses and protozoa such as salmonella, campylobacter or giardia.

These organisms can pose a health risk in water used for recreational activities such as swimming.

See more at: www.boprc.govt.nz/swimmingwaterquality

Ecological health

Aquatic macroinvertebrates (such as aquatic insects, snails and shrimp) are very useful for assessing stream health. A water sample captures a single moment in time, however macroinvertebrates are influenced by a wide range of factors over a longer time period.

A healthy macroinvertebrate community is typically found in streams with good or excellent health. Monitoring results from 2013/14 show that streams draining from native bush and exotic forest have the highest ecological health, while the ecological health of streams draining from pasture is lower.

Stream health was especially low in the Rangitāiki River's main channel on the plains. Other sites, particularly in the lower Rangitāiki, had macroinvertebrate communities indicative of fair to poor health.

Macroinvertebrates are collected from the streambed by disturbing the streambed immediately above a triangular net, which captures all dislodged material (both invertebrates and organic matter).

Nutrients

Excess nutrients can cause increased growth of macrophytes (aquatic plants) and algae. The macrophytes can then clog water intakes, use up dissolved oxygen during the night or as they decompose, and dramatically change habitat suitability for fish and other wildlife.

The graphs below show total phosphorus and nitrogen loads at sites monitored by the Regional Council in 2013. These show a general increase in nutrients moving down the catchment. Nitrate levels are also increasing at Murupara.