Recreational use of rivers, lakes and beaches

Every summer between November and March, Council staff work with the three district councils and the Taranaki District Health Board to ensure water quality in our rivers, lakes and beaches is suitable for swimming and recreation.

In Taranaki, the most popular freshwater and coastal bathing sites are suitable for swimming and recreation following two to three days of fine weather. However, during and after rainfall, faecal contamination can enter rivers, lakes and the coast 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.

Our recreational bathing monitoring programme involves collecting weekly water samples to test for faecal indicator bacteria, and undertaking surveys for potentially toxic algae – also known as cyanobacteria. The latest results are published on the Land, Air, Water Aotearoa (LAWA) website via 'Can I Swim Here?' and on each of the councils' websites.

37
popular swimming spots
are monitored Nov-Mar each year

Water was suitable for swimming
90% of the time at **19 monitored beach sites** and **65%** of the time at **18 monitored freshwater sites**
2015-2020

Long-term trends show beach water quality **improving** at **33%** of sites and **deteriorating** at **20%** of sites

42
out of 175 lake surveys
showed **toxic algae** present at levels unsafe for swimming

What we know

The Council's recreational water quality monitoring programme has undergone considerable change recently. Prior to November 2021, we collected recreational water quality samples during fine weather. Sampling now occurs weekly regardless of weather conditions. This change brings the Council's monitoring programme into line with new national policy requirements and provides our community with greater awareness of suitability for swimming and recreating during a range of weather conditions.

To date, the dry weather monitoring approach has helped the Council to characterise recreational water quality around the region during fine conditions when many people are likely to swim. We know that many 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.

Faecal indicator bacteria

In rivers and lakes, *Escherichia coli* (*E. coli*) is the preferred indicator organism; for beach sampling it is enterococci. By themselves, these organisms don't necessarily present a human health hazard. However, they are indicative of the presence of other harmful disease-causing bacteria, viruses and protozoa that cannot be detected so easily. When their numbers exceed guideline levels, faecal indictor bacteria signal an unacceptable level of risk to human health.
Both freshwater and marine guidelines have three levels: Surveillance (suitable for swimming), Alert (still suitable for swimming, but caution advised) and Action (unsuitable for swimming).

Recreational water	Faecal indicator bacteria	Guideline Mode		
		Surveillance	Alert	Action
Freshwater	*E. coli* (no per 100 ml)	No single sample >260	Single sample 261-550	Single sample >550
Marine	Enterococci (no per 100 ml)	No single sample >140	Single sample >140	Two consecutive samples > 280

Guideline values for swimming and recreation are set out in the Ministry for the Environment and Ministry of Health's 2003 Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas.

Between November 2015 and March 2020, we collected 1,232 samples from 18 freshwater river and lake sites across the region. As noted above, these samples were collected during fine weather conditions. Some sites were included in our annual monitoring programme while others were sampled on a rotational (three-yearly) basis.

Under the guidelines, 806 samples (65%) were at a surveillance level and suitable for swimming, while 208 samples (17%) were at alert level where caution was

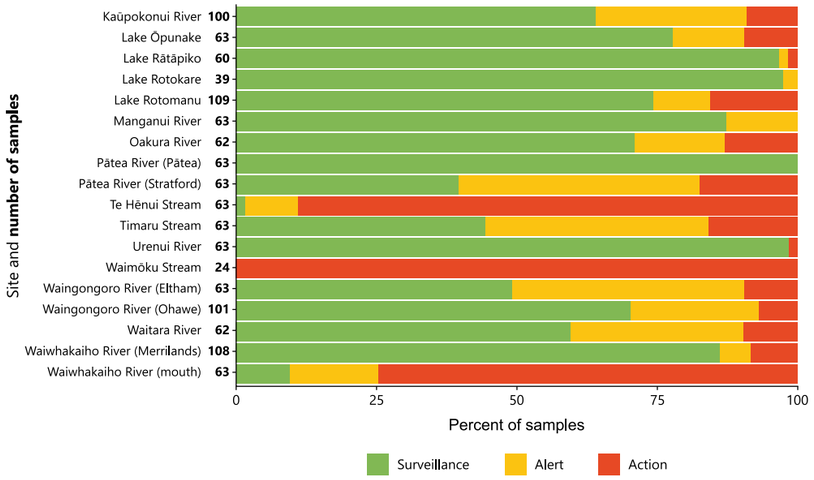
advised. A total of 218 samples (18%) were at action level, meaning these sites were unsuitable for swimming at this time.

More than half of those samples (127 of 218) came from just three urban sites in the lower reaches of Te Hēnui Stream, Waiwhakaiho River at New Plymouth and Waimoku Stream at Oākura. Permanent health risk warnings have been posted at each site. Bacteria levels at the remaining 15 sites were acceptable for swimming (below the action guideline) on 92% or more sampling occasions. Pātea and Urenui Rivers (under high tide conditions) and Lakes Rātāpiko and Rotokare were the sites suitable for swimming most often.

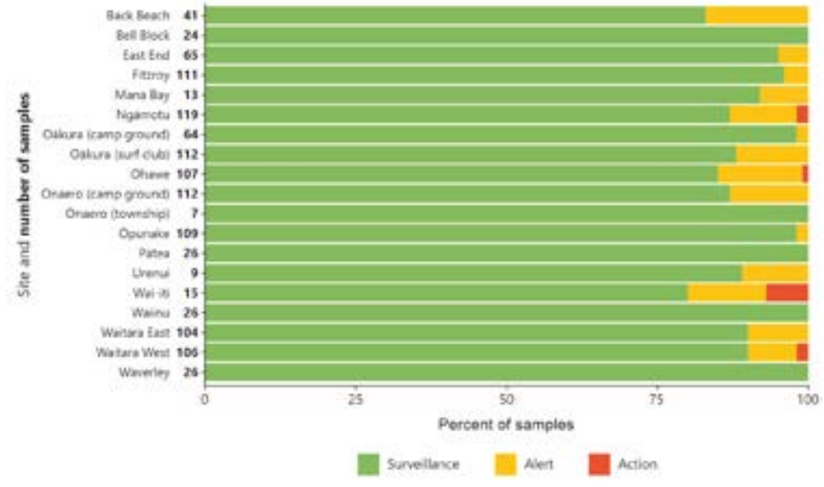
The proportion of guideline exceedances was far fewer in marine waters over the same five-year period, based on 1,196 water samples collected from 19 swimming beaches. Of those, 1,094 sample results (91.5%) were in surveillance mode, 96 samples (8%) were in alert mode and six (0.5%) were in action mode.

Of the 10 annually monitored beaches, four remained in surveillance mode on 95% or more of the sampling occasions (Ōpunake 98%, Oākura opposite the campground 98%, Fitzroy 96% and East End 95%). Another two beaches were in surveillance mode on 90% of the sampling occasions (Waitara East and Waitara West). The remaining four were in surveillance mode on 85 - 89% of occasions (Oākura opposite the surf club 88%, Ngāmotu 87%, Onaero at campground 87% and Ohawe beach 85%).

The proportion of sampling occasions where the rotationally monitored beaches were in surveillance mode ranged from 80 to 100%. There were six occasions where beaches were deemed unsuitable for swimming (action mode) between 2015 and 2020. This included Wai-iti and Ohawe on one occasion, and Waitara West and Ngāmotu Beach on two occasions.



Percentage of river and lake samples collected between 2015 and 2020 achieving surveillance, alert and action levels. The number of samples collected is shown next to each site name.



Percentage of beach samples collected between 2015 and 2020 achieving surveillance, alert and action levels. The number of samples collected is shown next to each site name. Sites with more than 50 samples were monitored annually; the others were monitored on a three-yearly rotational basis.

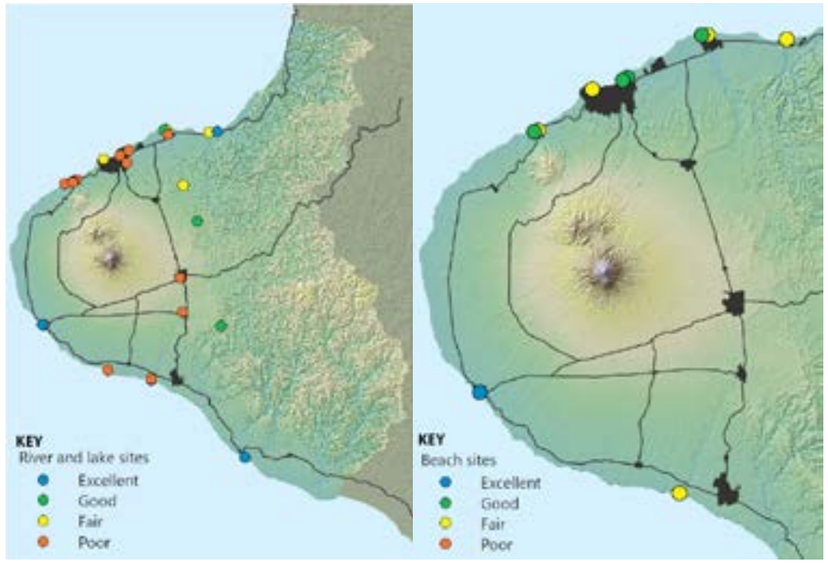
Long-term suitability for swimming

To assess overall suitability for swimming and recreation, long-term grades are calculated using five years' worth of data and applying the 95th percentile to *E. coli* results for freshwaters and enterococci for marine waters. These grades provide a general indicator of swimming water quality.

Out of 18 freshwater sites, the microbiological water quality for contact recreation was "excellent" at two sites, "good" at two sites, "fair" at one site, and "poor" at the other 13 sites. The highest quality was at two estuarine sites, Pātea and Urenui, followed by Lakes Rātāpiko and Rotokare. Further inland, Manganui River at Everett Park received a fair grade. The lowest graded sites were streams draining the ring plain, mainly near the coast, with two sites inland at Eltham and Stratford.

Of the 10 annually monitored swimming beaches, the long-term grade was 'excellent' at one (Ōpunake Beach), 'good' at four (Waitara West, Fitzroy, East End and Oākura Beach opposite the campground) and 'fair' at five (Onaero at the campground, Waitara East, Ngāmotu Beach, Oākura opposite the surf club and Ohawe Beach). None of the beaches had a 'poor' long-term grade.

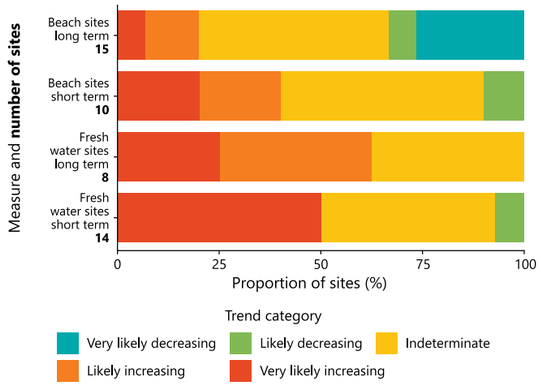
Long-term grades are generally higher (and the number of guideline exceedances lower) at beaches located further from potential sources of contamination such as river and stream mouths and stormwater outlets. The difference in water quality between Oākura opposite the campground and Oākura opposite the surf club is a good example of this. Although these sites are only 300m apart, the Waimoku Stream often meanders in front of the surf club; affecting coastal water quality where it enters the sea. As a result, microbiological water quality at the surf club site has received a 'fair' grade, while the campground site is graded 'good', with 10% fewer guideline exceedances.



Long-term (five-year) recreational water grades for annually monitored freshwater sites (left) and coastal beaches (right).

Eight river and lake monitoring sites had sufficient data to carry out long-term (20+ years) trend analysis. Five river sites (63%) showed deteriorating trends over the long term and no sites showed improvement. Trends for three sites (37%) were indeterminate. Short-term (10-year) trends could be calculated for 14 sites. Over the short term, one site (7%), Lake Rotomanu in New Plymouth, showed an improving trend. Seven sites (50%) showed a deteriorating trend: Kaūpokonui River at the beach domain, Oakura River at Corbett Park, Pātea River at Stratford, Timaru Stream at the coast, Waingongoro River at Eltham, Waingongoro River at Ohawe Beach, and Waitara River at the Waitara town wharf. Trends for six sites (43%) were indeterminate.

Fifteen beach monitoring sites had sufficient data to carry out long-term (20+ years) trend analyses. Short-term (10-year) trends could be calculated for 10 sites. Over the long-term periods, five sites (33%) showed improving trends, three (20%) degrading trends, while trends for the remaining seven sites (47%) were indeterminate. Over the 10-year period, one beach site (10%), Oākura opposite the surf club, showed improvement. Four beach sites (40%), Ngāmotu, Ohawe, Onaero at the campground, and Waitara East, showed deteriorating trends. Trends at the remaining five beach sites (50%) were indeterminate. When comparing the long-term results with the short-term results, there were only three beaches where trend direction did not change. Overall, compared to the long-term results, there were a higher proportion of deteriorating and indeterminate trends and a lower proportion of improving trends.



Summary of long-term and short-term trends of faecal indicator bacteria numbers for all monitored beaches and freshwater sites.

Potentially toxic algae (cyanobacteria)

In rivers, potentially toxic algae (or cyanobacteria) typically require a hard substrate such as cobbles and boulders to attach to. When conditions are suitable cyanobacteria can form in numbers that produce mats that cover stony riverbeds or in lakes form bright green or blue 'blooms' or scums at the lake edge. Both benthic (found in rivers) and planktonic (found in lakes) cyanobacteria increase in numbers during favourable conditions, which include warmer water temperatures and greater sunlight hours along with moderate nutrient levels.

Potentially toxic algae or cyanobacteria surveys consist of a visual assessment of benthic cyanobacteria on the riverbed, and microscopic analysis of water samples for planktonic cyanobacteria in lakes. When levels of cyanobacteria exceed the guidelines, there is an increased potential health risk. When 'action' mode is reached, sites are closed for recreational use. Since 2012, we have done monthly benthic cyanobacteria surveys from November through March at nine river monitoring sites in the region.

Mode	Benthic cyanobacteria – rivers		Planktonic cyanobacteria – lakes	
	Percentage cover of potentially toxigenic cyanobacteria attached to substrate	Presence of detaching and exposed mats	Cyanobacteria total cell count (cells/mL)	Bio-volume (mm3/L)
Surveillance (low risk)	Up to 20%	Nil	Less than 2,000	<0.5
Alert (medium risk)	20–50%	Minor	2,000 to 15,000	0.5-1.8
Action (high risk)	Greater than 50%	Significant	More than 15,000	>1.8

Benthic (rivers) and planktonic (lakes) cyanobacteria assessment guidelines (adapted from Ministry for the Environment and Ministry of Health, 2009).

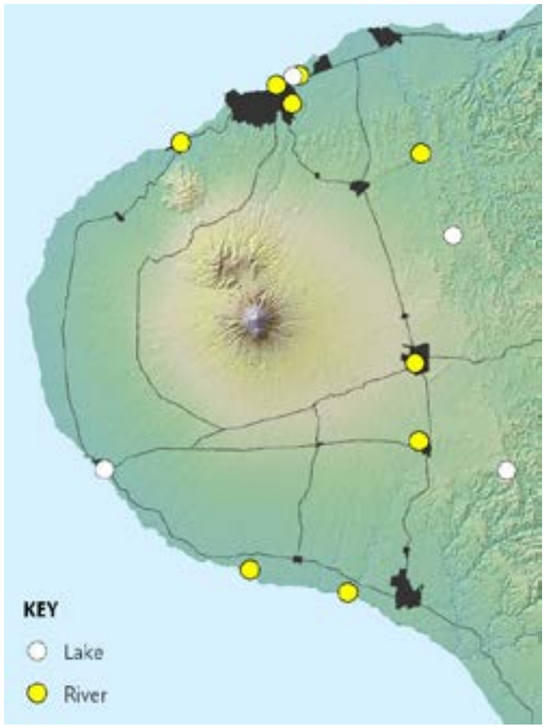
Cyanobacteria (Microcoleous sp.) mat found on the bed of a Taranaki river.

Period	Total surveys	Surveillance (up to 20% of substrate cover, and no detached or exposed mats)	Alert (20–50% of substrate cover, and/or minor presence of detached or exposed mats)	Action (greater than 50% of substrate cover, and/or signif-icant presence of detached or exposed mats)
2015-2016	121	105	15	1
2016-2017	107	104	3	0
2017-2018	96	92	4	0
2018-2019	114	106	8	0
2019-2020	98	88	9	1
Total	536	495	39	2

Benthic cyanobacteria results showing the number of Alert and Action mode events in monitored rivers, 2015-2020.

Since 2014, planktonic cyanobacteria has been monitored at four lakes during the recreational bathing season, with surveys carried out approximately every two weeks. During the past five years, there were 42 occasions (24%) when cyanobacteria levels reached action level. Each time the lake was closed to recreational users. During the majority of surveys, cyanobacteria levels were at alert (15%) or surveillance level (61%) where samples were below 0.5mm^3/L and no additional monitoring was required.

Roughly half of the action mode events for planktonic cyanobacteria during 2015-2020 occurred at Lake Rotokare, including the eight highest results.



Cyanobacteria monitoring sites in Taranaki lakes and rivers.

Monitoring period	Total surveys	Surveillance (<0.5mm3/L)	Alert (0.5 – 1.8mm3/L)	Action (>1.8mm3/L)
2015-2016	31	12	7	12
2016-2017	29	17	3	9
2017-2018	36	22	2	12
2018-2019	42	28	6	8
2019-2020	37	27	9	1
Total	175	106	27	42

Planktonic cyanobacteria results showing the number of surveillance, alert and action mode events in monitored lakes, 2015-2020.

What we're doing

New monitoring sites added

Keeping our community up to date with the latest water quality information is the focus of the recreational bathing monitoring programme.

A community survey of 524 people over summer 2019-2020 found that beach sites, particularly those central to New Plymouth, were the most frequented sites, with Fitzroy Beach and the Coastal Walkway top of the table in terms of popularity. Travel distance and proximity were important factors in determining where people choose to visit. For more than half of the respondents (56%), time constraints due to work and family commitments was the main reason people didn't visit rivers, lakes and beaches as much as they would like.

The survey also found that most people perceive access to recreational areas to be good, and identified that the majority of the most popular sites were already being monitored. In response to the survey findings, we added five new sites to the programme: Waiwhakaiho River at Meeting of the Waters, Lake Rotorangi, Tongaporutu Estuary, and Waiinu and Wai-iti Beaches. Monitoring of the new sites began in summer 2021-2022.

Faecal source tracking

When waterways become contaminated, identifying the source of the pollution is an important part of the contamination management strategy. During the past 12 years, the Council has carried out inspections and DNA analysis to identify sources of faecal contamination at popular swimming and recreation locations. Faecal source tracking methods have been employed at 20 locations around the region where water quality issues have warranted further investigation.

Faecal source tracking techniques can help identify sources of faecal contamination of water, for example whether they are from animals, humans or birds. If an initial test indicates high levels of *E. coli*, we can undertake further analysis from a 'toolbox' of methods. This could include extracting DNA from water samples to identify microorganisms present in faeces, which are specific to their animal hosts. When certain microorganisms are present, it indicates the source of the faecal contamination, which could be human, or from livestock, dogs or wildfowl. Livestock are often the main contributor of faecal bacteria in rural areas, whereas large flocks of birds (including gulls, ducks and pūkeko) have contributed to water quality issues in some urban areas near the coast. Occasionally, sources of human wastewater have

also been detected in urban waterways, often associated with aged or faulty infrastructure.

In 2019, faecal source tracking techniques were used to discover the presence of human sewage contaminants in the stormwater discharging from the Urenui township into the estuary. Other than this, no new sources of human faecal contamination in recreational waters have been found as a result of faecal source investigations in Taranaki over the last five years.

Where we're heading

One shortcoming of the current recreational water quality monitoring design is that there will always be a delay between sample collection, analysis, receiving results and delivering the public health advice. This is primarily because bacteria need time to grow in the lab as part of the analytical process. While we can try to minimise the time between sample collection and delivery of the information, there will always be a delay.

By collecting all-weather water quality data, it may be possible to develop a predictive rainfall risk model, which can forecast the contamination risk of bathing waters, based on preceding rainfall volumes and/or river flows. As the Council collects more data, we will be able to explore opportunities to develop a rainfall risk model to give real time predictions of water contamination risk.

In the meantime, the public is advised to check the latest testing results on the LAWA or Council websites, consider whether there's been heavy rain during the last three days, and avoid murky water where their toes aren't visible when knee deep. Check for submerged logs, swift water and other hazards such as cliffs or overhanging trees. Keep a close eye on your friends and whanau. And remember, if in doubt – stay out.