

Potentially toxic cyanobacteria

Potentially toxic cyanobacteria monitoring is carried out at a number of popular freshwater recreation sites in Canterbury during summer.

What are potentially toxic cyanobacteria?

Cyanobacteria are an ancient group of organisms with characteristics in common with both bacteria and algae. They are often referred to as blue-green algae. The naturally occurring cyanobacteria are widespread in many lakes and rivers in New Zealand.

Under favourable conditions, cyanobacteria cells can multiply and form suspended planktonic blooms in slow-moving water such as lakes, or thick mats attached to benthic substrates such as rocks in river beds.

Some cyanobacteria species have the ability to produce natural toxins called cyanotoxins, which are potentially harmful to people and animals. If potentially toxic cyanobacteria are abundant, you should presume that the water is unsafe for contact recreation or consumption.

Never swim or take part in any activity that may result in accidental consumption or exposure to water affected by cyanobacteria mats or blooms – even if there are no visible signs of a bloom. Do not let livestock or dogs swim in or drink from the water. Even if the water in a river or on a lake appears completely normal to the naked eye, it can still have large numbers of cyanobacteria present.

You can find river and lake warnings on our website – www.ecan.govt.nz.

Health risks

Water users have been known to develop adverse reactions after swimming or coming into contact with water and/or mats containing cyanotoxins.

Adverse reactions in humans may include:

- asthma
- eye irritations
- tingling and numbness around the mouth and fingertips

Quick facts

- Cyanobacteria occur naturally all year round, but their abundance can rapidly increase during the warmer months.
- If water is cloudy, discoloured, has small globules suspended in it, or forms coloured scums, avoid all contact.
- Not all cyanobacterial blooms are visible to the naked eye and toxins can persist after visible blooms disappear.
- Cyanobacteria concentrations can change quickly with changing environmental conditions, such as wind.
- If a health warning is in place, avoid contact with the water.

Warnings

- skin rashes and blistering around the mouth and nose
- gastrointestinal disorders, such as nausea, abdominal pain, cramps and diarrhoea
- other specific long-term effects, such as liver damage and possibly the development of cancers.

We publish up-to-date health warnings relating to potentially toxic cyanobacteria on our website – www.ecan.govt.nz. Even if no warnings are in place for a river, lake or bay, you should always assess the situation carefully before entering the water.

For information on health warning guidelines, refer to the New Zealand Guidelines for Cyanobacteria in Recreational Fresh Waters available at www.mfe.govt.nz.

Figure 1. Examples of signage that will be displayed if a health warning is in place.

River recreation

It is not possible to monitor all the reaches of a river for cyanobacteria. It is therefore important for members of the public to know how to identify cyanobacteria mats and prevent themselves and their animals from coming into contact with them.

If the bed of a river is covered in thick dark brown or black mats that have a slimy/velvety texture and earthy/musty smell, it is better to be cautious and totally avoid that river site.

Lake recreation

Winds on a lake may concentrate a bloom in a bay and make it unsafe for recreational contact. This can occur at any time of the year, but is more common in the warmer summer months.

If the water of a lake is cloudy, discoloured, or has small globules suspended in it, it is better to be cautious and totally avoid that lake or bay.

Risk to animals

Potentially toxic cyanobacteria can pose a risk to animals if they eat algal mats or ingest algae when drinking from a watercourse.

Dogs are particularly at risk when swimming and drinking from rivers and lakes.

Symptoms of cyanotoxin poisoning in dogs include panting, lethargy, muscle tremors, twitching and convulsions. These symptoms usually occur within 30 minutes.

If you experience health symptoms within minutes of contact with water contaminated with potentially toxic cyanobacteria, you should avoid further contact with the water. If symptoms persist, contact Community and Public Health on 03 379 9480 in North-Mid Canterbury or (03) 687 2600 in South Canterbury – or go and see your doctor. If you are concerned about your pet, you should contact a veterinarian immediately. You can also contact your local council with queries regarding risks to animals and water supplies.

Types of blue-green algae

While planktonic (suspended) and benthic (stream bed) cyanobacteria share similar traits, their visual appearances are quite different. Planktonic cyanobacteria blooms are not confined to lakes nor are benthic mats confined to rivers, but this is where we most often see them.

Planktonic cyanobacteria in lakes

Planktonic cyanobacteria is algae that is suspended in the water column of slow moving waters such as a lake. The species that cause toxic blooms are *Nodularia*, *Anabaena*, *Microcystis* and *Picocyanobacteria*.

Nodularia, *Anabaena* and *Microcystis* generally form a thick, bright green colouration to water and can produce scums on the water surface. *Picocyanobacteria*, which is a major species causing potentially toxic blooms in Te Waihora/Lake Ellesmere, often does not have obvious visual traits.

Routine monitoring for potentially toxic planktonic cyanobacteria is carried out monthly for Te Roto o Wairewa/Lake Forsyth and Te Waihora/Lake Ellesmere. You can find cyanobacteria lake warnings on our website – www.ecan.govt.nz. Monitoring is more frequent when potentially toxic planktonic cyanobacteria are identified.

Benthic cyanobacteria in rivers

Benthic cyanobacteria is attached to substrates such as gravels, cobbles and boulders on a river bed. Its appearance depends on species.

Phormidium occurs naturally throughout Canterbury and in flowing water can form thick, dark brown/black cohesive mats. The species may detach from the riverbed and become caught in other debris in the river.

When *Phormidium* mats die and dry out, they become light brown or white in colour, but may still be toxic.

Nostoc is another mat-forming benthic cyanobacteria. It forms small globular mats or gelatinous 'bobbles' firmly attached to a hard substrates and is relatively translucent in colour.

The more brightly-coloured long filamentous green algae that are commonly found in rivers and streams are harmless as they do not produce toxins.

Routine monitoring for potentially toxic benthic cyanobacteria is carried out at a number of sites that are popular for recreational activities such as swimming, fishing, boating and dog walking. You can find cyanobacteria river warnings on our website – www.ecan.govt.nz.

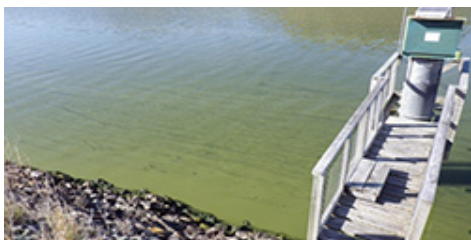


Figure 2.
Planktonic *Nodularia* sp. forming bright green scums in Te Wairewa/Lake Forsyth.



Figure 4.
Nostoc mats attached to substrate in a river.



Figure 3.
Phormidium mats attached to substrate in a river.

What causes cyanobacteria blooms?

The formation of extensive mats or blooms of cyanobacteria is linked with changes in environmental conditions. Different species react differently to environmental cues. Favourable conditions include the right combination of warm temperatures, sunlight, low or stable river flows and nutrients.

The influence of nutrient concentrations in the water column is variable depending on the species and their nutrient requirements. In lakes, planktonic cyanobacteria species are nitrogen-fixing, therefore they have a greater requirement for phosphorus. In rivers, the *Phormidium* species is not known to be a nitrogen fixer, and therefore it has a greater requirement for water column nitrogen.

Nutrient concentrations in the water column indicate that *Phormidium* can occur in waters where dissolved phosphorus concentrations are relatively low. Given phosphorus has a high affinity for sediment, there is evidence that suggests *Phormidium* may utilise sediment-bound phosphorus in rivers.

Human activities, such as water abstraction and flow regime alteration, or nutrient and sediment additions to waterways, may exuberate prolific blooms.

Frequently asked questions

How do I know if the water contains toxin-producing cyanobacteria?

Identification of cyanobacteria requires a microscope and its presence alone does not confirm cyanotoxin production. Not all species produce cyanotoxins and not all toxic species produce toxins continuously. Cyanotoxins themselves are identified using a range of laboratory tests. The factors that trigger toxin production in cyanobacteria are not completely understood.

What risk do cyanobacteria pose to stock and domestic pets?

Dogs are particularly susceptible to poisoning from both mat-forming and free-floating/suspended cyanobacteria as they enjoy being in the water and may consume these algae intentionally or by accident. Livestock are also at risk from cyanotoxin poisoning and should be provided with alternative drinking water sources.

Symptoms of poisoning in animals exposed to the type of cyanotoxins present in *Phormidium* mats include lethargy, muscle tremors, fast breathing, twitching, paralysis and convulsions. In extreme cases, death can occur within 30 minutes after symptoms first appear. If you are concerned, contact a veterinarian immediately. You or your vet can report any animal illness resulting from contact with the cyanobacteria to your local council.

What are the health risks to humans from toxin-producing cyanobacteria?

People swimming or showering in water containing cyanotoxins have been known to develop allergic reactions. These include asthma, eye irritations, rashes, blistering around the mouth and nose and gastrointestinal disorders such as abdominal pain, cramps and diarrhoea.

Any reaction depends on the type of

cyanobacteria and cyanotoxins present, and their concentrations in the water. The higher the concentrations and the longer the exposure, the more severe the symptoms are likely to be.

Who should I call if I think I have experienced a reaction?

If you think you have experienced a reaction, see your doctor and tell them that you think you have been exposed to potentially toxic cyanobacteria.

Is it safe to drink water containing toxin-producing cyanobacteria?

No. Toxins are not removed by boiling, normal filtering systems or by adding household disinfectants. The known health risks are from direct contact with algae in river or lake water. However, streams with private water supplies near dense blooms of benthic cyanobacteria (<50 % cover) should be treated with caution and further advice may be warranted from Environment Canterbury or Community and Public Health. There is no evidence, to date, of algal toxins being found at significant levels in reticulated water supplies in Canterbury.

Can I eat fish or shellfish from water with toxin-producing cyanobacteria?

Eating mussels and other shellfish from affected areas should be avoided as they can concentrate the cyanotoxins produced by cyanobacteria. If you choose to eat fish from waters containing toxic cyanobacteria, you should eat them in moderation. Avoid eating internal organs, such as the liver and kidney of the fish, as this is where accumulation of cyanotoxins may be the greatest. Affected fish may taste earthy. Avoid contact with the water while fishing and wash all fish in clean water.

Is it safe to boat or canoe in water with toxin-producing cyanobacteria?

How safe boating and canoeing are depends on the amount of direct contact with the water. If you swallow the water or your skin is in contact with the water while boating or canoeing, you are at risk from a reaction to any cyanotoxins that may be present. The higher the concentrations of cyanobacteria and cyanotoxins, and the longer that people are in contact with the water, the more likely a reaction is to occur. Wash boats, canoes and life-jackets down with clean water after use.

Will wearing a wetsuit protect me?

No. Cyanobacteria may accumulate in the collar and cuff areas of your wetsuit and rub against your skin. This may cause a strong skin reaction in these areas. If you do choose to wear a wetsuit and go into the water, take care to rinse any cyanobacteria off the wetsuit with clean water.

Can I water my garden with water that contains toxin-producing cyanobacteria?

Yes. Fruit and vegetables do not appear to absorb cyanotoxins. However, fruit and vegetables should be washed in clean water, as cyanobacteria may form a residue on the surface, which can remain toxic even when dry.

Can I use water containing toxin-producing cyanobacteria to put out fires?

You should avoid taking water from all affected areas. If you do take water, stand away from sprays to avoid contact with or inhalation of aerosols.