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MASSEY UNIVERSITY TE KUNENGA KI PŪREHUROA UNIVERSITY OF NEW ZEALAND

Image: Dr. Russell Death, Massey University

# Blue Green Algae in New Zealand Rivers

Environmental Fact Sheet

**The occurrence and distribution of potentially toxin-producing benthic cyanobacteria (blue-green algae) mats has increased in New Zealand over the last decade.**

**Health warnings to avoid contact recreation in waterways that have been issued over summer, because of the potential risk from those toxins, are also increasing.**

**Even beaches in more pristine lakes, such as Lake Taupo, have had blue-green algae blooms that have cancelled swimming events.**

Image: *Fine sediment entering Hutt River near St Pats, Silverstream* – Dr. Mike Joy

In rivers and streams the most common cyanobacteria is *Phormidium* that can produce anatoxins which are lethal for animals, and potentially humans, if they consume either the algae in the water or even the dried form on river beaches. Very low exposure, such as a few mouthfuls of algae-contaminated water, may result in fatal poisoning.

The neurotoxin can cause liver damage, vomiting, diarrhoea, jaundice, seizures, disorientation, coma, shock, tingling, numbness and difficulties with breathing. The cyanobacteria are not always toxic, but the only way to assess the toxicity is with laboratory testing.

Freshwater scientists still understand very little about the triggers for the cyanobacteria producing toxins. Some rivers may have prolific mats but the blue-greens present produce little or no toxin, or there can be very little cyanobacteria yet what is present is high in toxins. Even within the mats on a single stone some cells may produce the toxin and others do not.

It is always best to assume that the presence of any cyanobacteria, even if only in the dry form on the river banks, is potentially toxic and avoid any contact with the material or water in which it is growing.

Unlike true algae, cyanobacteria proliferations occur at, and potentially prefer low DRP (Dissolved Reactive Phosphorous) nutrient levels (DRP < 0.01 mg/l) and moderately enriched nitrate-nitrogen levels (0.1 mg/l < DIN < 1.2 mg/l). Although *Phormidium* mats are more common in summer there does not appear to be any increase in *Phormidium* mats associated with warmer temperatures.

A common feature of the *Phormidium* mats is a thin layer of fine sediment at the substrate/mat interface that may provide DRP for the cyanobacteria allowing it to grow in rivers with very low water column DRP. Deposition of fine sediment (<0.63 um) is thus often associated with excess growths.

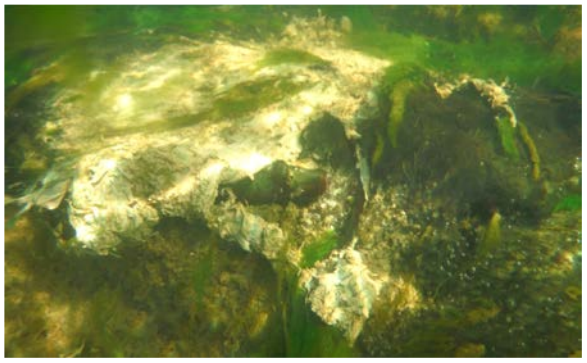

Image: Dr. Russell Death, Massey University

## Why are proliferations increasing in New Zealand?

Demand for water, particularly over the summer period, is increasing throughout New Zealand with both direct and indirect (via groundwater) water abstraction from streams and river's increasing in frequency and size. This may be further exacerbated when water takes are constrained to high flows. This results in fewer substrate scouring or entrainment events that could remove mats. *Phormidium* proliferations tend to occur where there is an increase in sediment-bound phosphorus predominantly in agriculture and forestry dominated catchments. Although they can also be prolific downstream of sewage treatment plant discharges.

**As with many changes to the ecology of New Zealand waterways it is unlikely that any single factor is driving the increase in *Phormidium* blooms.**

Research is ongoing, but it is likely that changes to flood frequency from water abstraction and climate change, increases in fine sediment from erosion on pastoral agriculture land, stock trampling of stream banks and streambeds, forest earthworks and harvesting, and potentially reductions in water column DRP are all leading to more cyanobacterial blooms.

## Important points for plantation forestry

**01**

Cyanobacteria is potentially fatal for livestock, animals and humans, even at very low levels.

**02**

Fine sediment is associated with cyanobacterial blooms. This is just as likely to come from agricultural land as forestry land. Any reduction in sediment run-off to waterways will help reduce cyanobacterial blooms.

**03**

Unlike true algae, cyanobacterial blooms are not associated with high nutrients.

**04**

Water abstraction and altered flow regimes from dams and water takes may result in increases in cyanobacterial blooms.

Other sources of information:

McAllister, Tara G., Wood, Susanna A., and Hawes, Ian (2016), 'The rise of toxic benthic Phormidium proliferations: A review of their taxonomy, distribution, toxin content and factors regulating prevalence and increased severity', Harmful Algae, 55, 282-94.

Ministry for the Environment guidelines
https://www.mfe.govt.nz/sites/default/files/nz-guidelines-cyanobacteria-recreational-fresh-waters.pdf

Images of Algae
http://www.mfe.govt.nz/publications/fresh-water/new-zealand-guidelines-cyanobacteria-recreational-fresh-waters-interim-5

www.nzfoa.org.nz

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