

# Faecal source DNA tracking study

## What it is

At their August 2015 workshop, the Collaborative Stakeholder Group received the results of a DairyNZ funded study aimed at better understanding the sources (and transport pathways) of faecal matter in tributaries of the Waikato River. The study was conducted by the Institute of Environmental Science and Research.

## Why it was needed

Faecal bacteria are one of the four contaminants (along with sediment, nitrogen and phosphorus) that the proposed plan change aims to reduce in water bodies in the Waikato and Waipa river catchments.

Faecal pollution of water is a risk to human health. Faecal matter from land-based animals enters water bodies carrying disease-causing microbes including *Salmonella* and *Campylobacter*. People using water contaminated with faecal matter may become sick by drinking the water, gathering food or from recreational activities.

An understanding of where the faecal matter comes from is needed to effectively manage it. Faecal matter can enter water bodies in a number of ways including direct deposition, overland flow during rainfall, discharge of effluent collected on farms and poorly managed human sewage systems.

## How it was done

The study investigated three sources of faecal matter:

- avian - waterfowl that live in or near water bodies, such as ducks, geese, swans and gulls
- ruminant - plant eating animals, such as cows, goats and sheep, with four-chambered stomachs
- human.

Water samples were taken from five streams known to have high *E. coli* levels: Karapiro, Komakorau, Mangaone, Mangaonua and the Mangawhero Stream. *E. coli* is a commonly used indicator of faecal contamination.

Sites were sampled on six occasions; half of the samples were taken during dry periods, and half were after rainfall.

Faecal matter sources were studied using molecular markers. This method extracts a sample's total DNA and searches for DNA from microorganisms with known faecal sources. Samples were checked for DNA of microorganisms that occur in ruminant, human and avian faeces.

The samples were also analysed for total *E. coli* concentrations to understand how rainfall affects *E. coli* concentrations in the rivers.

## Results

- Human faecal markers were not detected in any of the samples.
- Ruminant faecal markers (mainly from cows and sheep) were found in varying concentrations in almost all of the samples.
- Concentrations of ruminant faecal matter increased after rainfall, sometimes becoming the only source of pollution in the sample after rainfall events.
- Avian faecal markers were detected at all sites but not on all occasions. Avian faecal markers increased after rainfall in some streams.
- *E. coli* increased in all locations after rainfall, though high levels were found in most samples, regardless of rainfall. This means rainfall wasn't always responsible for high *E. coli* levels. According to Waikato Regional Council monitoring data (2009 to 2013), *E. coli* levels at the five sites sampled exceeded acceptable levels for primary contact (i.e. swimming).

The results indicate that stock exclusion, riparian buffers to intercept overland flow and improved effluent management could reduce the inputs of ruminant faecal material to rural waterways. Managing the inputs from waterfowl is more problematic.

## Further information

The full study will be publicly available once final approvals are complete.

## More information



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