

Mangatarere Stream catchment water quality investigation

Key points:

- Water quality is excellent at the Mangatarere Gorge but declines downstream of this point. Aquatic invertebrate health also declines with distance down the Mangatarere Stream.
- There was a lack of flow in some stream reaches during summer 2009, contributing to warmer water temperatures and nuisance algal growth.
- Water quality and aquatic invertebrate health in the lower reaches of the Mangatarere Stream have deteriorated since 2003.
- The application of piggery and dairy effluent onto land contributes to elevated nitrogen concentrations in groundwater and the Mangatarere Stream.
- Phosphorus loads were highest in the lower reaches of the stream below the discharge from the Carterton wastewater treatment plant.
- When stream sampling coincided with rain events, diffuse sources, including runoff from pasture, contributed the majority of the nutrient loading.

Why did we investigate water quality in the Mangatarere catchment?

The Mangatarere is a large rural stream in Wairarapa with significant management issues. While the headwaters of the Mangatarere are pristine and have significant fish values and the river into which it discharges (the Waiohine) has very good water quality, the middle and lower reaches of the stream have poor water quality. This is because this part of the catchment experiences the cumulative effects of water abstraction, intensive farming, and the discharge of treated municipal wastewater from Carterton township.

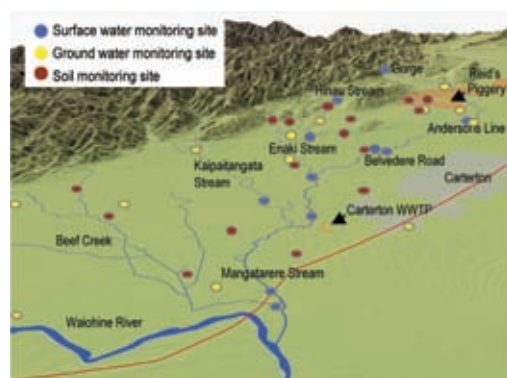
Routine monitoring by Greater Wellington has consistently shown that nutrient concentrations in the stream are high on both a regional and national scale. Understanding the problem and causes of this poor water quality is vital before we can take steps towards improving the health of the stream.



The mid reaches of the Mangatarere Stream at Andersons Line

What did the investigation involve?

Greater Wellington spent 13 months on an intensive environmental monitoring programme and also reviewed long-term water quality data and resource consent data from within the Mangatarere catchment. The monitoring programme, carried out in 2008 and 2009, involved monthly water sampling at 11 stream sites and two-monthly sampling of 13 groundwater bores. The water samples were tested for a range of variables such as suspended sediment, nutrients, *E. coli* bacteria and metals. Algae and invertebrate (e.g. insects and snails) samples were also collected to provide an indicator of the stream's ecological health. In addition, soil samples were taken from 16 locations under different land uses and tested for organic material, nutrients, fertility and trace elements. The purpose of the soil and groundwater sampling was to help pinpoint contaminant sources.



Sampling sites. Stream flow was measured each time water samples were collected.



Measuring flow in the Kaipaitangata Stream, a tributary of the Mangatarere stream. Note the cattle beast in the background with access to the stream.

What did we find?

The state of water quality in the Mangatarere Stream

Water quality was excellent at the Mangatarere Gorge but gradually got worse below this point as the stream flows across the intensively farmed plains. The stream water had increasingly high concentrations of dissolved nutrients and *E. coli* bacteria and, at some sites, reduced water clarity, elevated water temperatures and nuisance algal growth. Aquatic invertebrate health also declined with distance down the Mangatarere Stream.

Site-specific impacts were identified, particularly in parts of the Enaki Stream and Beef Creek subcatchments. These included compacted soils – which can promote overland flow of effluent into streams and drains – and stock access to waterways, resulting in significant water quality impacts. There was also a lack of flow in some stream reaches during summer. While this can occur naturally, it is made worse by the taking of water from streams and shallow bores for irrigation.

Has water quality been getting better or worse?

Long-term data shows that since 2003 water quality has changed. There has been an improvement in stream water temperature, *E. coli* counts, and in water clarity. However, this is countered by significant increases in the concentrations of phosphorus and ammoniacal nitrogen and a decline in stream invertebrate health. This tells us that, overall, water quality in the lower reaches of the Mangatarere Stream has declined since 2003.

Nutrient sources

The total amount or 'load' of nutrients – in particular soluble (available) nitrogen and phosphorus – was found to increase in the Mangatarere Stream downstream from the gorge. While nitrogen loads increased steadily across the plains, phosphorus loads only increased significantly in the lower reaches of the stream below the discharge from the Carterton wastewater treatment plant. Monitoring by Carterton District Council confirms that the wastewater discharge has had a measureable impact on stream health.

Beef Creek was found to contribute relatively large loads of nitrogen and phosphorus to the lower reaches of the Mangatarere Stream. It is estimated that one-third of the nitrogen load in the Mangatarere Stream (as it enters the Waiohine River) comes from Beef Creek. The Beef Creek subcatchment comprises both dairying and drystock farming, highlighting the impact intensive agriculture can have on water quality. These impacts can occur through both surface runoff of dairyshed effluent and fertilisers, and effluent and fertilisers leaching through the soil to enter shallow groundwater systems that are connected to streams.

The application of piggery effluent onto land in the mid reaches of the Mangatarere catchment was found to be having a measureable impact on soil, groundwater and stream water quality. In particular, the activity has resulted in elevated nitrogen concentrations in groundwater. This groundwater then receives further nitrogen inputs from dairy farming in the mid catchment before joining the Mangatarere Stream downstream of Andersons Line. During rainfall events, other diffuse sources – including runoff from pasture – contributed the majority of the nutrient loading.

The results of the investigation clearly show that there is a need to manage both point and diffuse sources of nitrogen and phosphorus in the catchment.

What next?

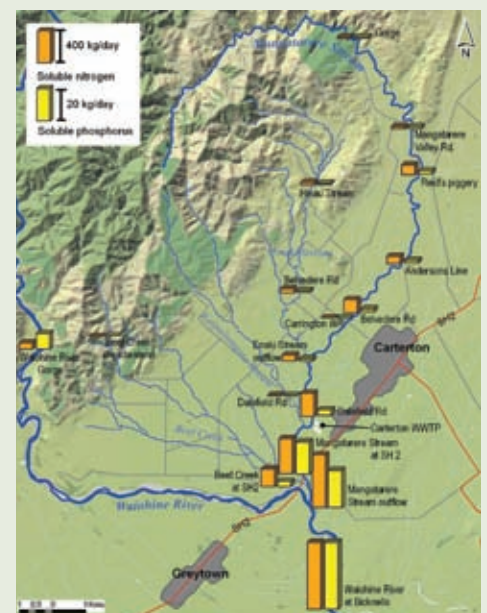
Addressing the causes of water quality degradation highlighted by this investigation will require a cooperative effort. Greater Wellington would like to establish joint initiatives with iwi, landowners, industry groups and the wider community to address water quality issues. Options include riparian rehabilitation (already occurring and benefiting aquatic life in the lower Enaki Stream), bridged stock and vehicle stream crossings, stock exclusion from streams and deferred storage for dairyshed effluent.



The lower reaches of the Enaki Stream reduced to a few pools in February 2009



Dairy cows in the Enaki Stream



Average loads of soluble (readily available) nitrogen and phosphorus at different locations in the Mangatarere catchment during the investigation period. Loads are calculated by multiplying the nutrient concentrations in the stream by stream flow. The height of each coloured bar is proportional to the nutrient load present.

More information

The information on this card is a summary of a comprehensive technical report, which is available at www.gw.govt.nz/technical-reports

If you would like to know more, visit our website or contact us: Phone: 04 384 5708 (Wellington office) or 06 378 2484 (Masterton office)

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