

Water quality and ecological health of rivers in the Tokomairiro catchment

August 2011 - April 2012



In August 2011, the Otago Regional Council (ORC) initiated an intensive investigation into water quality and ecological health in the Tokomairiro catchment.

Why did we investigate water quality in the Tokomairiro catchment?

Long-term State of Environment (SOE) monitoring has shown a decline in water quality in the last five years. The catchment is dominated by intensive farming, and on the Tokomairiro Plain tile-mole and open drains are used extensively. Therefore local waterways are at high risk of pollution from poorly managed farming activities.

ORC investigated water quality patterns in a bid to better understand water quality issues in the catchment. The investigation also sought to identify pollution hotspots so appropriate strategies can be put in place to better manage water quality if required.



A pugged paddock that has an ephemeral stream flowing through it contributing sediment to the Tokomairiro River.

What did the investigation involve?

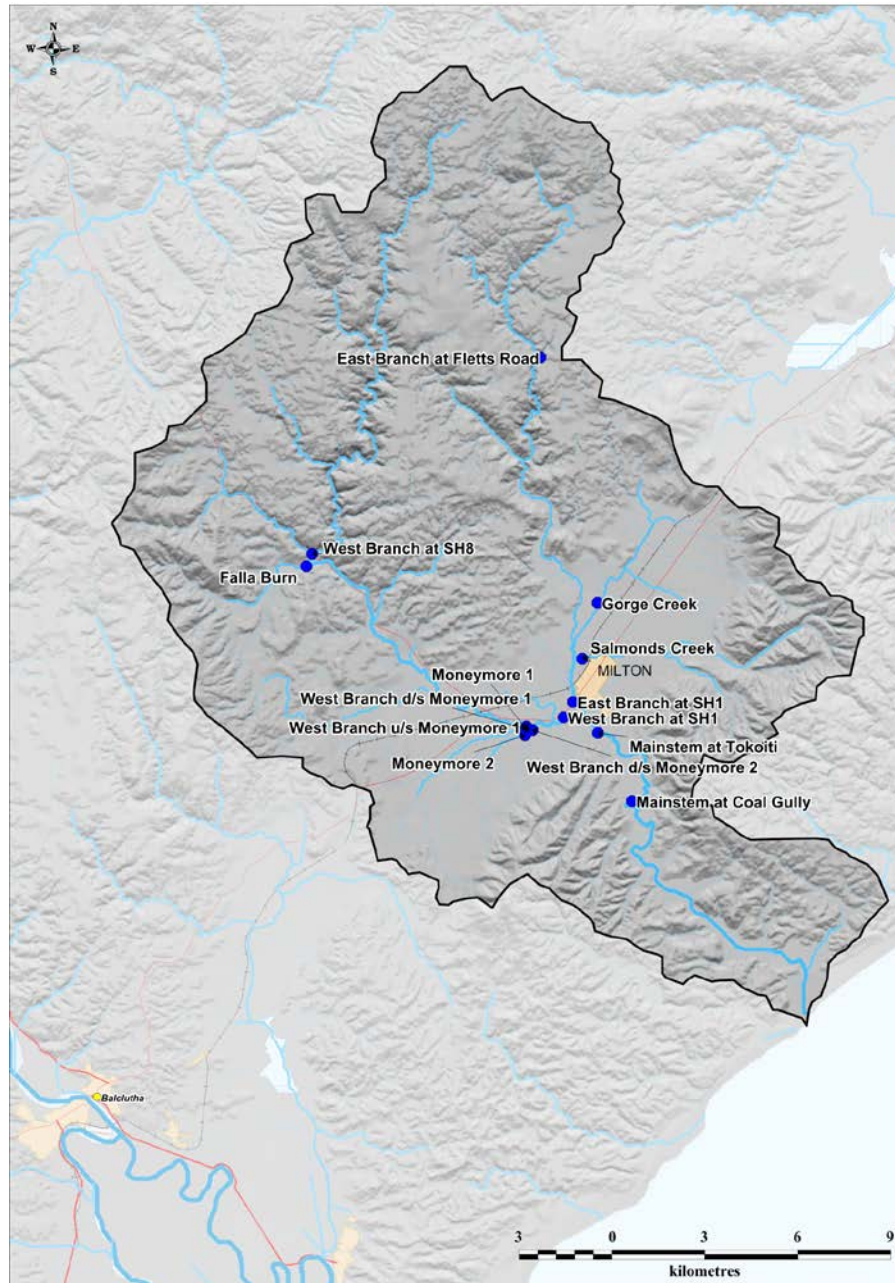
The monitoring programme ran from August 2011 to April 2012. Fortnightly water samples were collected from 14 sites and were tested for nutrients, sediment and bacteria. In the summer of 2011/2012, ecological surveys were conducted at most sites collecting data on macroinvertebrates, fish and habitat characteristics.



Falla Burn with stable banks



Coarse substrate in the Falla Burn



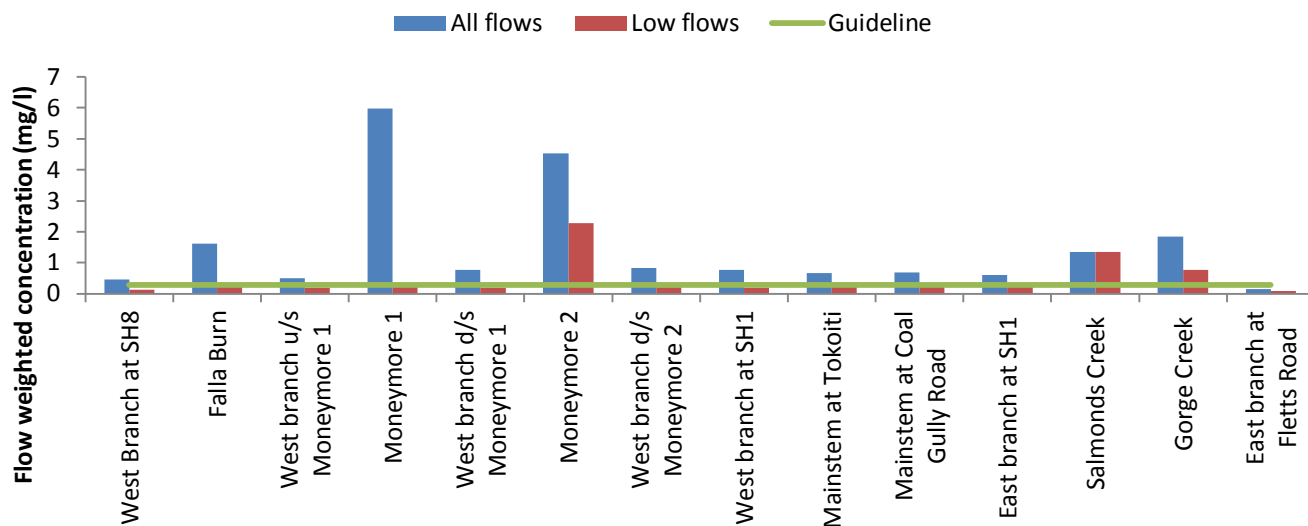
Site map for the Tokomairiro River catchment

Water quality

Water samples were divided into two groups: **all flows**, which comprised all the samples taken; and **low flows**, which comprised only those samples collected when flows were less than median flow. Below median flows typically occur during the summer period, which is the high risk period for algal and macrophyte growth and the most likely time for contact recreation. The results showed that water quality was often poor.

Sediment was elevated at the majority of sites for all flows. Bacteria counts were elevated at all sites and excessively high in the Moneymore drains. Nitrogen concentrations were elevated at all sites for the all flow category (except for the East Branch at Fletts Road) and most elevated in the Moneymore Drains.

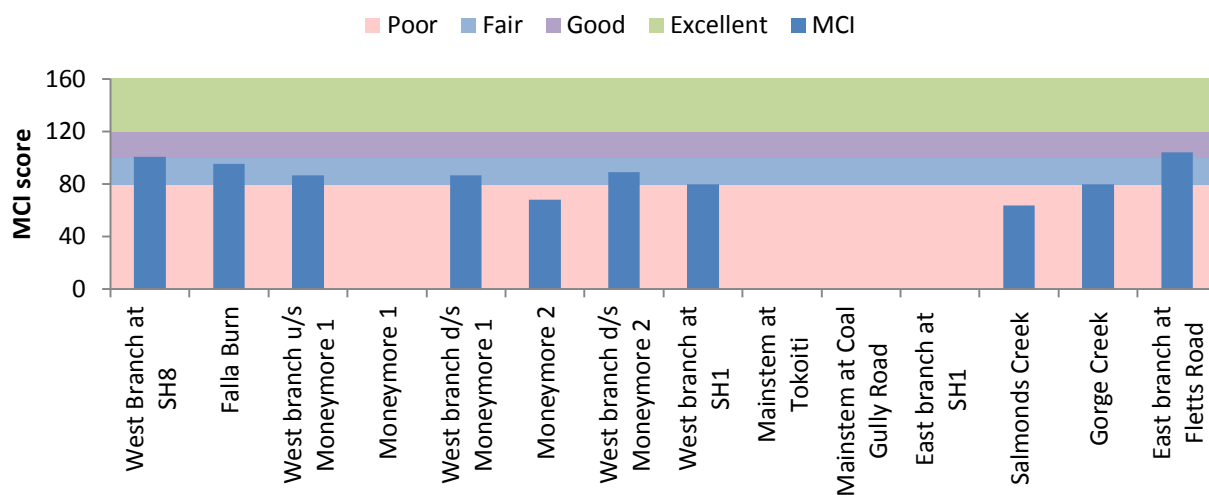
Phosphorus concentrations were elevated in the Moneymore Drains and monitoring sites downstream of the Moneymore Drains. Gorge Creek also had elevated Phosphorus concentrations. Many of the samples collected at the Moneymore Drains were consistent with samples contaminated with dairy shed effluent.



Flow weighted nitrite-nitrate-nitrogen concentrations for all sampling sites.

Stream biology

Macroinvertebrates and fish are used as indicators of ecological health. At the sites where macroinvertebrate and fish surveys could practically be undertaken, there was evidence of degradation. Moneymore 2, West Branch at SH1, Gorge Creek, and Salmonds Creek all had poor macroinvertebrate communities which suggests severe pollution. East Branch at Fletts Road had the highest-scoring macroinvertebrate community and was considered 'good', closely followed by West Branch at SH8. These two sites, representing the top monitoring locations for each branch, both had coarse substrate which allows for healthy macroinvertebrate communities to thrive. In contrast, the sites with poor and fair communities were often dominated by fine substrate due to sedimentation.



Instream ecology

Water quality, physical habitat, and ecological values are summarised in Table 1. Each category was ranked as poor, fair, good, or excellent. When water quality and physical habitat were good, ecological values were good as well. This was the case at the West Branch at SH8 and the East Branch at Fletts Road. Conversely, when water quality and habitat were degraded, ecological values were often impaired, as was identified for the majority of sites.

Where ecological values were impaired, the main causes were degraded water quality and in-stream habitat particularly where fine sediment smothered the river bed. Land use practices such as stream straightening, winter feed management, and poor riparian management were a major cause of the problem; although the geology naturally provides an ample source of fine sediment. Poor riparian management can include the lack of stock exclusion, which pugs up stream banks, and results in stream bed sedimentation. There is also a lack of riparian vegetation, which provides bank stability, and food and habitat resources for both macroinvertebrates and fish.

Site	Water quality	Physical habitat	Macroinvertebrate community	Brown trout population
Site	Good	Good	Excellent	Fair
West Branch at SH8	Fair	Fair	Excellent	Fair
Falla Burn	Poor	Fair	Good	Fair
West branch u/s Moneymore 1	Poor	-	-	-
Moneymore 1	Poor	Poor	Fair	-
West branch d/s Moneymore 1	Poor	-	-	-
Moneymore 2	Poor	Poor	Fair	Poor
West branch d/s Moneymore 2	Poor	Fair	Poor	Poor
West branch at SH1	Poor	-	-	-
Mainstem at Tokoiti	Poor	-	-	-
Mainstem at Coal Gully Road	Poor	-	-	-
East branch at SH1	Fair	Fair	Poor	Poor
Salmonds Creek	Poor	Poor	Fair	Poor
Gorge Creek	Good	Excellent	Excellent	Fair

Summary

- Water quality was poor or fair throughout much of the catchment with only a few sites recording a good classification.
- The Moneymore drains were the most polluted sites in the catchment and contributed to increases in pollution downstream of their confluence with the west branch of the Tokomairiro River.
- In the east branch, the majority of water quality degradation came from the Gorge Creek and Salmonds Creek catchments.
- The Tokomairiro River is particularly susceptible to sedimentation due to local geology, and therefore loss of good habitat is common.
- Trout populations were fair at the upper sites of both the East and West branches of the Tokomairiro River and poor at most other sites. This was mainly due to the quality of the habitat.
- Intensive farming and poor land use practices are clearly the cause of much of the degraded water quality and poor ecological health.

What next?

The results of this investigation will be shared with the local community to encourage, and enforce if necessary, better land management practices in the Tokomairiro River catchment.