



# River and stream health

## Taieri River Annual Monitoring Summary

2005

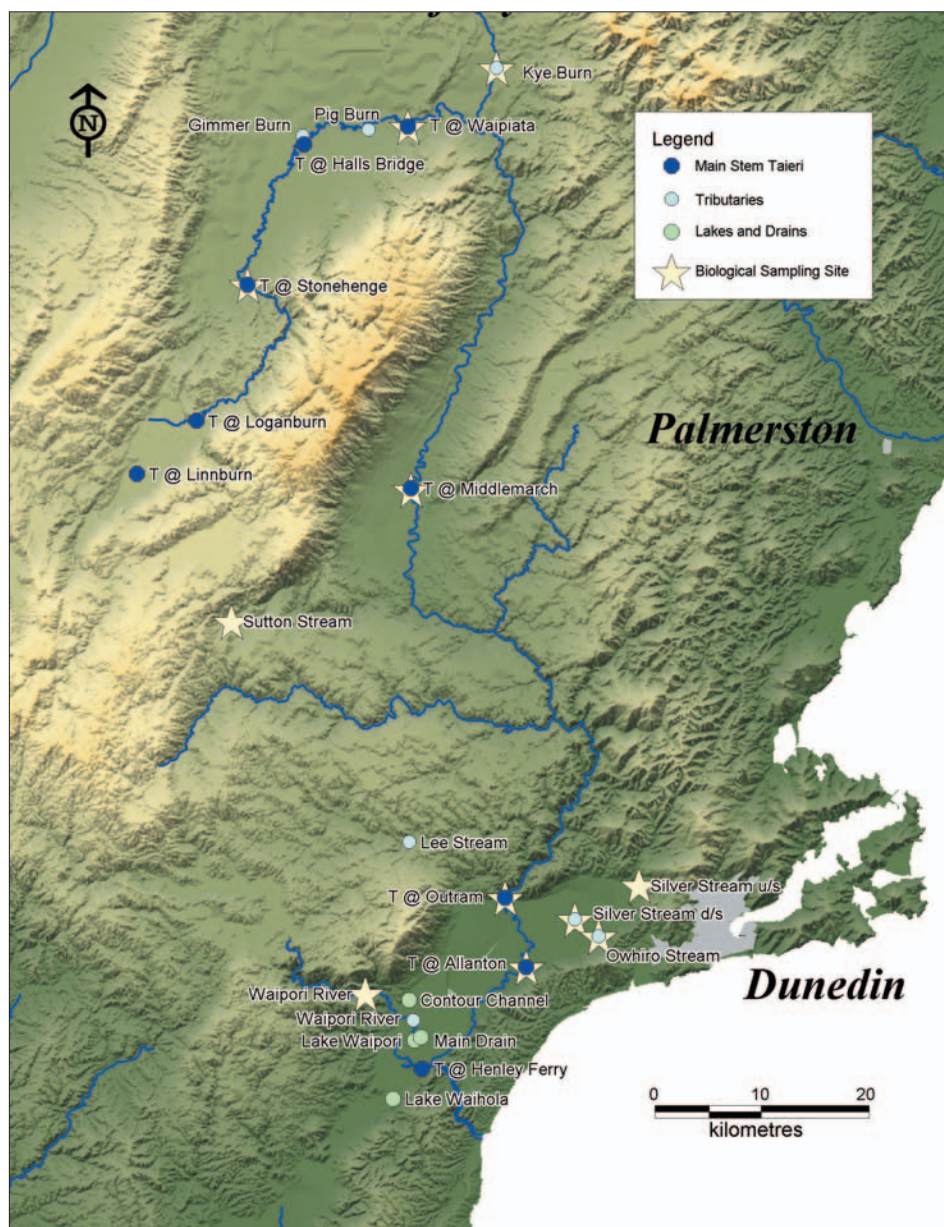
### Key points

- The lower Taieri has high levels of nutrients. Nitrogen and phosphorus are typically above the ANZECC water quality guideline trigger values.
- The median level of *Escherichia coli* was generally below the Department of Health (DoH) contact recreation guideline level of 126 E.coli/100ml.
- There is a reasonably good correlation between water quality and biological health.
- The Taieri River Monitoring Summary 1999-2003 has more details and trends.

### Water quality monitoring

In 2005 Otago Regional Council regularly monitored 20 stream and river sites in the Taieri catchment, to assess the current state of water quality.

With few significant point source discharges to freshwater in the Taieri catchment, land use has the most effect on water quality. The sites with poorer water quality are generally intensively farmed, such as the Lower Taieri Plain. The sites with better water quality are generally upland sites, which have less human influence, such as the two upstream mainstem Taieri sites.





## Water quality results

Water quality monitoring measures physical, chemical and microbiological indicators such as nutrients, bacteria, temperature and dissolved oxygen. The results were compared with national guidelines and standards and are represented in the graphs below.

*Note: the red lines on the graphs below show the ANZECC or DoH guideline level; the Dark Blue Group indicates the mainstem Taieri, the Light Blue Group are Taieri tributaries and the Green Group indicates the drains and lakes.*

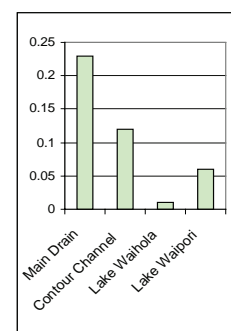
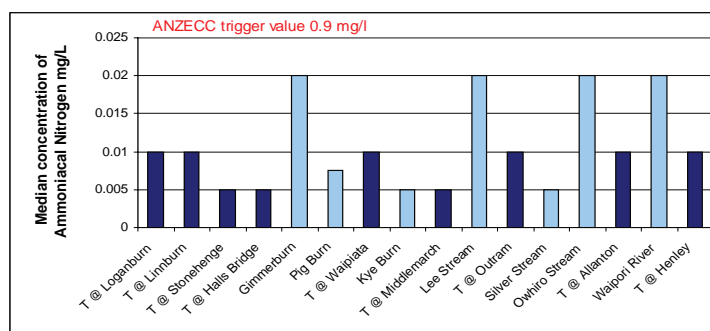
### Guidelines and standards

- The ANZECC (2000) guidelines outline trigger values for water quality aspects that put stress on river and stream health (e.g. nutrients, dissolved oxygen and pH). This specifies a level below which the risk of adverse biological effect is low.
- Otago's water quality standards are outlined in the Regional Plan: Water which sets targets to maintain and improve water quality within the region.
- The DoH (1992) guidelines for contact recreation waters recommend a season median of 126 *Escherichia coli*/100ml.

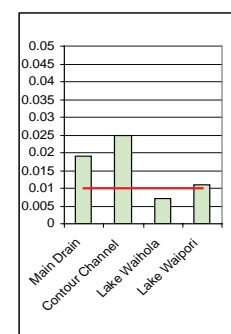
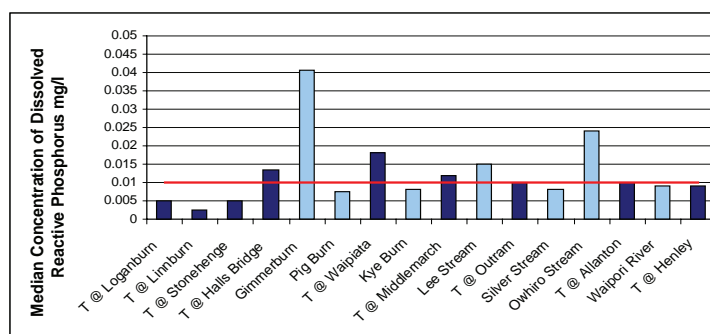
### Nutrients

Ammoniacal nitrogen is the combination of ammonium ions (NH<sub>4</sub>) and ammonia (NH<sub>3</sub>), the ANZECC 2000 high reliability (95%) trigger value for freshwater is 0.9 mg/l. NH<sub>3</sub> is the main poisonous component for aquatic organisms, the prevalence of which is dependent on the pH, temperature and salinity of the water. The ANZECC 2000 guideline for NH<sub>3</sub> is 0.021 mg/l.

At all sites the ammoniacal nitrogen levels were well below 0.9 mg/l, and the ammonia component (after considering temperature and pH) for all sites was less than 0.021 mg/l. *Note that the scales on the two graphs are different.*

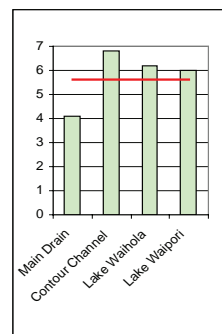
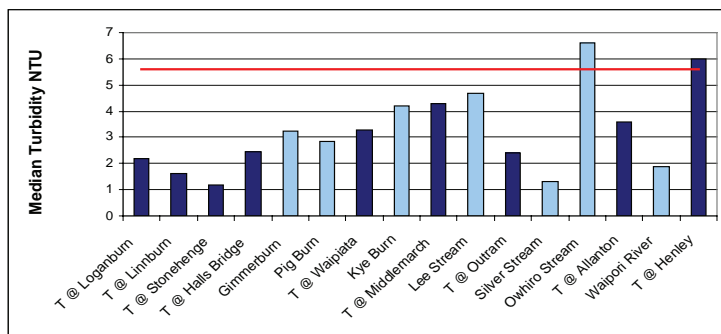


Dissolved reactive phosphorus levels in the Taieri mainstem exceed the ANZECC default trigger value at Halls Bridge, Waipiata and Middlemarch, concentrations further downstream then drop below this trigger value. The Gimmerburn has particularly high concentrations, which may be attributed to irrigation practices. Both drains exceeded the trigger value, as did Lake Waipori.



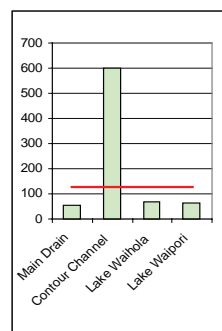
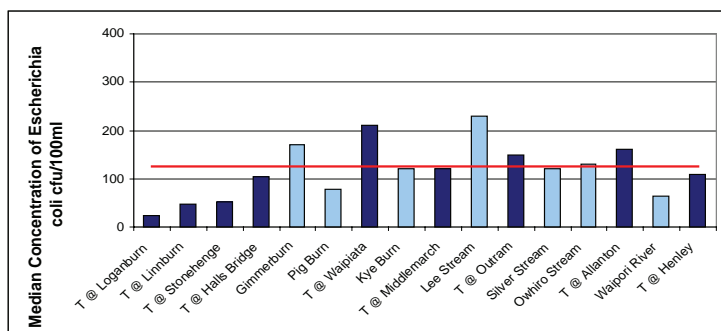
## Turbidity

Turbidity was elevated above the ANZECC trigger value of 5.6 NTU at four sites: Henley (tidal), Owhiro (shallow and disturbed by wildlife), the two shallow lakes (re-suspension of sediment by wind) and the Contour Channel.



## Bacteria

The Department of Health (1992) guidelines for contact recreation waters recommend a season median of 126 Escherichia coli /100ml. In 2005 this was exceeded at four sites: Waipiata, Gimmer Burn, Lee Stream and the Contour Channel, although water quality would be compromised at most sites following rainfall. *Note that the scales on the two graphs are different.*



## Other analytes

- The Main Drain was the only site with low dissolved oxygen levels.
- pH levels were generally within the guideline values for all sites.
- Water temperature in the Lower Taieri Plain was elevated compared to the other sites.



## Other documents

- Monitoring the effects of irrigation runoff on water quality on tributaries in the Upper Taieri (Gimmerburn, Sowburn and Pigburn)
- The Taieri River Catchment Monitoring Report 1999 to 2003

Each of these documents will be available in late 2006 on the ORC website under Environmental Monitoring.

## Recent ORC reports

- Lake Waihola and Lake Waipori: Trophic Level Status. March 2005
- A review of the sites chosen for the river and stream health monitoring programme, based on information needs, best practice and Otago Regional Council's management objectives. March 2006.

Available now on the ORC website under Environmental Monitoring.

## Ecosystem health results

Ecosystem health takes into account a wide range of inter-linked factors, such as water quality, habitat and instream biota. It is generally assessed using two communities that are important to the food chain in rivers and streams: streambed macroinvertebrates (eg insects, crustaceans, snails, worms) and periphyton (eg algae).

These biological indices put a large amount of information into a compact form. Therefore they are inherently coarse tools that give a broad view of general patterns, however they are useful as the presence or absence, abundance, and distribution of species can tell us much about the quality and condition of the site in which they live.

A key component of the MCI index is the availability of suitable habitat. The MCI index is designed specifically for stony riffle substrates in flowing water, MCI values can vary due to the availability of suitable habitat and not necessarily due to water quality. As substrate type can vary greatly between riffles it is often more appropriate to compare changes in MCI values at the same site over a period of time rather than between sites throughout the catchment. However, by understanding the limitation of the MCI index it still can be useful for picking up improvements or deterioration in water quality at individual sites over time.

In 2005, due to high river flows during the critical monitoring period, ecosystem health was not monitored. The results below are from 2004.

### Criteria for Macroinvertebrate Health

Macroinvertebrate Index	Poor	Average	Good	Excellent
MCI	< 80	80 – 99	110 – 119	> 120
SQMCI	< 4	4 – 4.99	5 – 5.99	> 6
Total species	< 10	15 – 20	20 – 30	> 30
Total EPT species	< 5	9 – 15	15 – 20	> 20

### Taieri River Macroinvertebrate Health 2004

Sample location	MCI	SQMCI	Total species	Total EPT
Stonehenge Main Stem	100	5.1	19	8
Waipiata Main Stem	98	5.6	20	9
Middlemarch Main Stem	93	5.3	24	9
Outram Main Stem	97	4.3	18	8
Allanton Main Stem	81	2.6	14	6
Kye Burn Tributary	104	6.7	18	7
Sutton Stm Tributary	115	5.0	25	12
Silver Stm u/s Tributary	110	4.8	26	14
Silver Stm u/s Tributary	73	2.8	9	1
Waipori Tributary	104	4.6	19	10
Owhiro Tributary	71	3.7	21	3.6



### Biological Indices

- **EPT species** – this index is a sum of the total number of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) species collected.
- **MCI** – the Macroinvertebrate Community Index is an index based on adding the “pollution tolerance” scores of all species found at a site. Species that are very sensitive to pollution score highly whereas more pollution tolerant species receive a low score.
- **SQMCI** – the Semi-quantitative Macroinvertebrate Community Index is a variation of the MCI that accounts for the abundance of pollution sensitive and tolerant species.

### Contact

Otago Regional Council  
Ph: 0800 474 082

[www.orc.govt.nz](http://www.orc.govt.nz)

