



# State of Water Quality in the Waituna Catchment

## March 2008 - 2009

• This newsletter provides an update on the current state of water quality in the Waituna catchment creeks and of the lagoon.

• The next publication will focus on trends in water quality over the last 10 years.

### Water Quality Guidelines and standards

The Australia and New Zealand Environment and Conservation Council guidelines (ANZECC, 2000) identify levels of nutrients, dissolved oxygen, pH, etc., which if exceeded could stress river and stream health. Guidelines are conservative estimates of the “concentration below which there is a low risk of negative biological effects occurring”. Values are derived from average New Zealand river water quality.

Southland’s water quality standards are outlined under the River Environment Classification (REC) framework in the Proposed Regional Freshwater Plan for Southland. The plan sets targets to maintain and improve water quality within the region. You can read the plan, on our website [www.es.govt.nz/Departments/Planning/FreshWaterPlan/](http://www.es.govt.nz/Departments/Planning/FreshWaterPlan/).

### Background

Environment Southland monitors water quality in the Waituna catchment at five fresh water creek sites and four lagoon sites every month (Figure 1). Water quality information is recorded for physical and chemical parameters (temperature, clarity, oxygen, sediment, nitrogen, phosphorus, pH, and conductivity) and for disease causing bacteria (E-coli), because all affect human, stock and environmental health. Regular monitoring allows us to understand the state of water quality over time.

### What has monitoring found?

During 2008-2009 water quality in Waituna’s creeks has been generally poor.

- The median concentrations of E. coli at all 5 creek sites were better than the recreational guideline, however all sites recorded values worse than the guideline during or soon after rainfall.
- Median concentrations of DRP at all 5 of the creek sites were worse than the guideline.
- Median concentrations of NNN at 3 of the creek sites were worse than the guideline.

DRP and NNN are the forms of phosphorus and nitrogen that are available for rapid plant uptake. Therefore high concentrations in surface water will promote the growth of weeds and algae in water courses which may be a nuisance and potentially toxic to some animals.

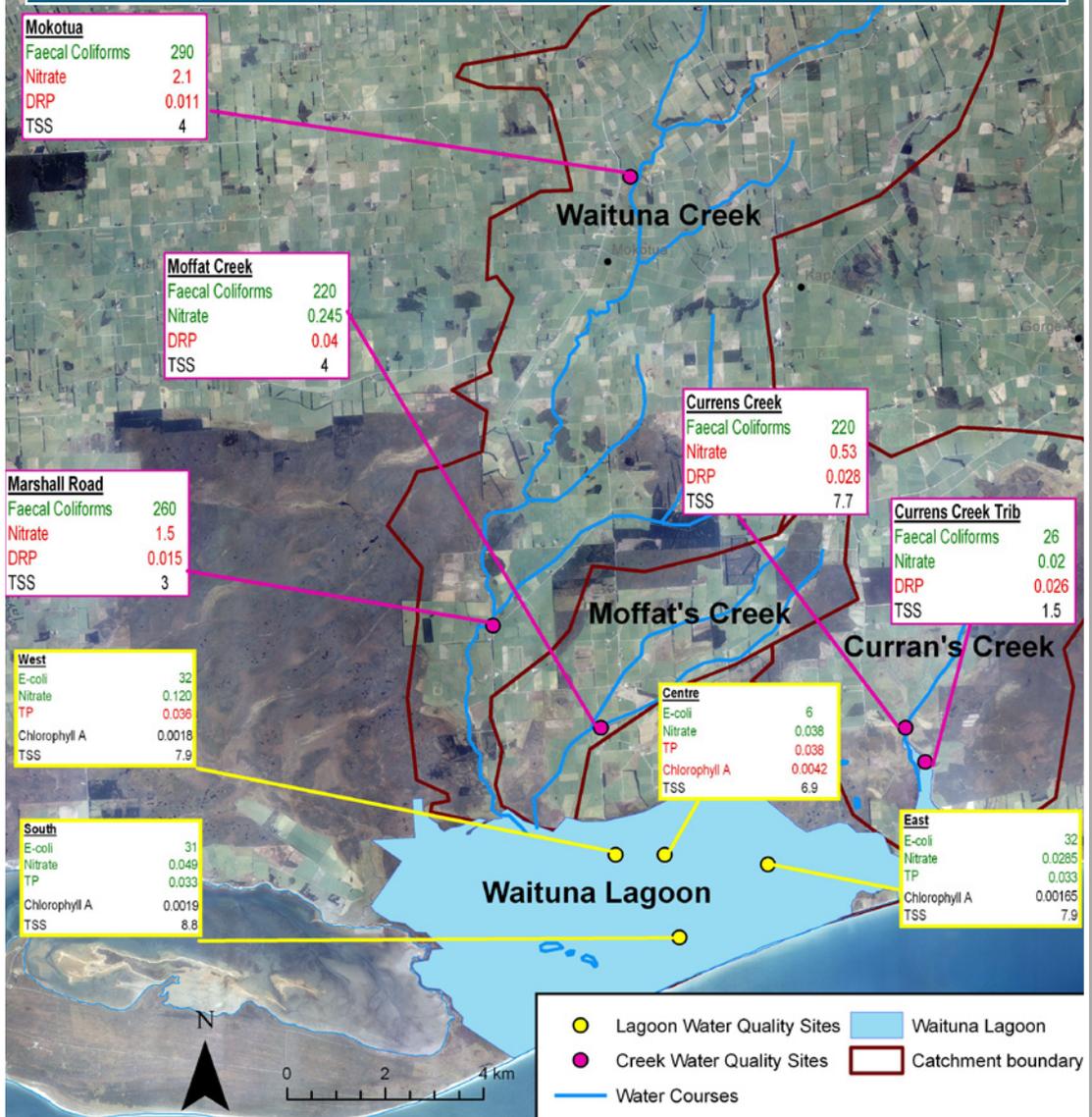


Figure 1. Waituna catchment median water quality results for March 2008 – March 2009. The yellow dots are sampling sites, green numbers represent results that are ‘better’ than the guideline while red numbers represent results that are ‘worse’.

**Creek Water Quality**

In June 2008, a nitrate spike was recorded at all creek sites (Figure 2), illustrating a considerable loss of nitrate from the catchment. The highest nitrate level was recorded in the Waituna Creek at Marshall Rd (Figure 2).

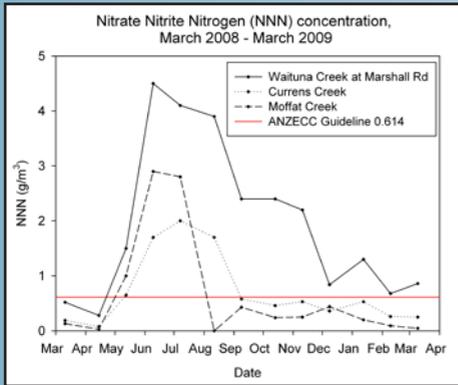


Figure 2. During March 2008 – March 2009 approximately 83% of NNN samples were worse than the guideline.

DRP concentrations in the creeks have been consistently worse than the guideline, illustrating a large loss of phosphorus from the catchment. Moffat Creek had the highest concentrations and a peak in February 2009 (Figure 3).

Many of the drains and creeks in the catchment contain vigorous plant growths. Their presence is often due to high nutrient concentrations, high water temperatures and a lack of shade in the creek.

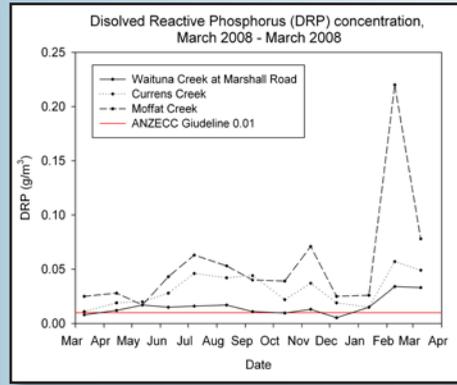


Figure 3. During March 2008 – March 2009 approximately 86% of DRP samples were worse than the guideline.

**Lagoon Water Quality**

The nitrate nitrogen concentration in the lagoon has been consistently worse than the guideline, particularly high spikes occurred in July of 2008 and March of 2009. Concentrations decreased following opening of the lagoon in August 2008. The nitrate concentration has been worse than the guideline since December 2008 (Figure 4).

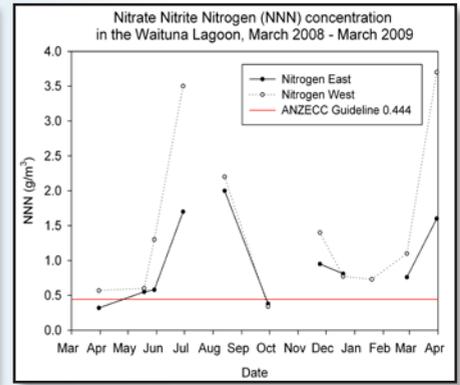


Figure 4. During Mar March 2008 – March 2009 approximately 42% of NNN samples in the lagoon were worse than the guideline.

The total phosphorus concentration in the lagoon has gradually increased over the last year (Figure 5). Concentrations decreased following the lagoon opening in August 2008 (Figure 7). TP concentrations are currently worse than the guideline (Figure 5). Increasing phosphorus concentrations are a result of both high volumes of phosphorus entering the lagoon from the creeks, and of the lagoon being open for only a short period of tidal flushing in the last 2 years.

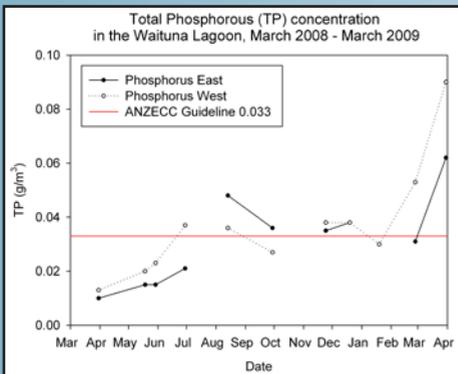


Figure 5. During March 2008 – March 2009 approximately 68% of TP samples in the lagoon were worse than the guideline.

The Chlorophyll-a concentration in the lagoon was low until March 2009, when a large increase was recorded (Figure 6). The Chlorophyll-a concentration gives an indication of the amount of plant and algal growth occurring in the lagoon. Increased Chlorophyll-a concentration is likely to have occurred as a result of increasing concentrations of phosphorus and nitrogen in the lagoon. Because phosphorus is the limiting nutrient in the lagoon, it regulates plant growth.

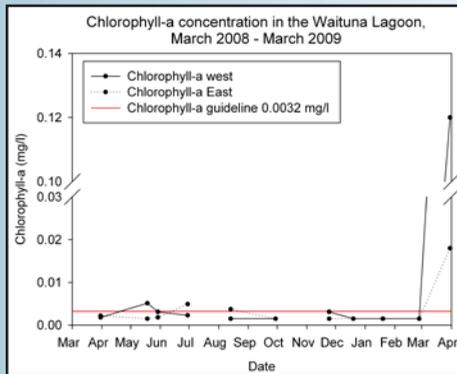


Figure 6. During March 2008 – March 2009 approximately 56% of Chlorophyll-a samples in the lagoon were worse than the guideline.

Environment Southland uses the Trophic Level Index (TLI) to assess water quality in lakes. The TLI considers the concentration of phosphorus, nitrogen, and Chlorophyll-a. As in previous years, the Waituna Lagoon this year is **eutrophic**, indicating the lagoon has poor water quality, moderately enriched with nutrients and algae.

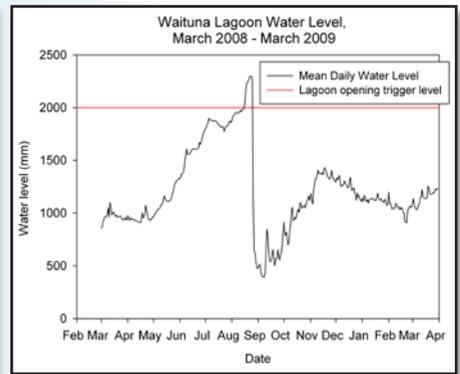


Figure 7. The lagoon water level gradually increased until it was opened in August 2008. Since the lagoon closed in September the level has gradually increased.

The guidelines used to assess water quality are:

WATER QUALITY INDICATOR	GUIDELINE
Environment Southland faecal bacteria standard	1000 cfu/100 ml
Ministry of Health standard	550 E. coli/100 ml
ANZECC Nitrate Nitrite Nitrogen	0.444 g/m <sup>3</sup>
ANZECC Total Nitrogen	0.614 g/m <sup>3</sup>
ANZECC Dissolved Reactive Phosphorus	0.010 g/m <sup>3</sup>
ANZECC Total Phosphorus	0.033 g/m <sup>3</sup>
Chlorophyll-a (Biggs, 2000)	0.0032 g/m <sup>3</sup>

**Further information**

More detail about water quality and current programmes at environment southland can be found on our website at [www.es.govt.nz](http://www.es.govt.nz)

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