



Coastal Water Quality - Monitoring 2019/2020

Key Points

- Council has an ongoing Sounds monitoring programme to determine water quality
- The data lets us distinguish between different impacts on water quality in the Sounds
- The waters of the Pelorus Sound/ Te Hoiere are strongly influenced by freshwater inputs from the Te hoiere/ Pelorus River.
- Council's monitoring data continuously improves the hydrodynamic models

What is Marlborough District Council doing?

Council has a state of the environment programme monitoring coastal water quality at 11 sites (Figure 1) in both the Queen Charlotte Sound/Tōtaranui (monthly since 2011) and Pelorus Sound/Te Hoiere (monthly since 2012). Long-term monitoring like this is essential to identify changes in water quality over time. Monthly monitoring gives a good indication of natural seasonal changes and catchment influences, and the data enables us to identify irregularities and determine their causes.

At each site, we take field measurements of water quality using an electronic sensor called a sonde. This measures biophysical parameters throughout the water column. Discrete water samples are also collected at a representative number of sites for more detailed lab analysis.

• What we measure

- **Dissolved oxygen:** Low saturations of oxygen in the water can be detrimental to marine life.
- **Chlorophyll α :** Chlorophyll α concentrations are used as a proxy for primary production (the amount of phytoplankton in the water).
- **Nutrient concentrations:** Concentrations of phosphorus and nitrogen drive primary production in the water.
- **Suspended sediment concentration, turbidity and secchi depth:** Combined, these build a picture on the influence of sediment on water quality.

As the ultimate receiving environment for contaminants from the land, the coastal marine area frequently comes under pressure from land-based stressors.

Poorly managed land use has the potential to dramatically increase loads of

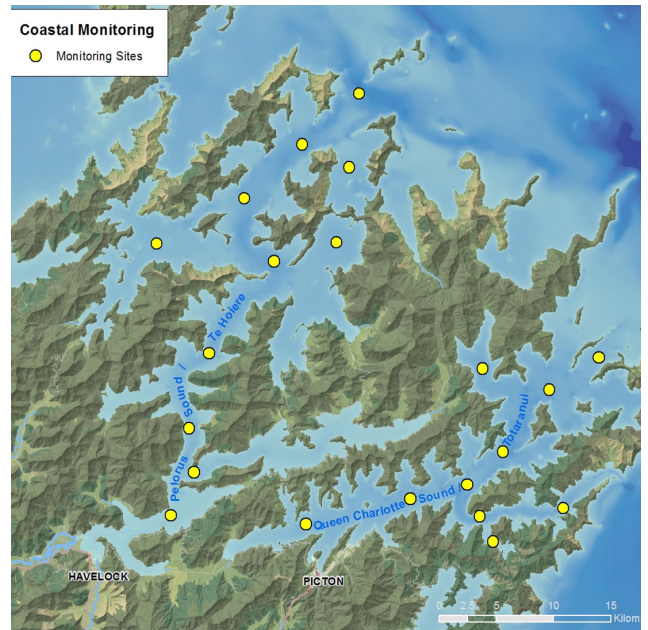


Figure 1: Map of sampling site locations in the Marlborough Sounds.

sediment and nutrients entering the marine environment, this can cause widespread ecological issues. Benthic ecosystems can be smothered by deposited sediment, and species distributions can be changed by reduced light availability in murky waters. Elevated nutrient loads can lead to blooms of macroalgae and phytoplankton that can smother other species and cause eutrophic conditions. These impacts are compounded where loads enter sheltered waterbodies such as the Sounds that are less well flushed than open coastal environments as contaminants can remain in these systems for much longer.

The future holds greater challenges as loads from the land are further increased and exacerbated by the effects of climate change such as increased storminess, sea level rise, temperature rise and ocean acidification.

The physical drivers of water quality in the Queen Charlotte Sound/Tōtaranui are quite different to Pelorus Sound/Te Hoiere. The biophysical models developed for the Sounds (reference below) have shown that the main influence on the water quality of the Queen Charlotte Sound/Tōtaranui is the inflow of oceanic water through Tory Channel/Kura Te Au. This results in a well flushed water body which is strongly influenced by oceanic conditions outside the sound. Adversely, Pelorus Sound/Te Hoiere is heavily influenced by freshwater inflows from the Te Hoiere and Kaituna catchments.

<https://www.marlborough.govt.nz/environment/coastal/coastal-water-quality/hydronomic-models>

This freshwater inflow is evident in the boxplots here depicting the past 5 years of data. Sites are ordered from left (closest in) to right (furthest down the sound). The measure of fresh water influence (conductivity - Figure 2 & 3) is higher and of water clarity (secchi depth - Figure 4 & 5) is lower at the sites in the inner Pelorus Sound/Te Hoiere compared to sites elsewhere. This is due to the proximity of the Te Hoiere/ Pelorus River influencing these sites.

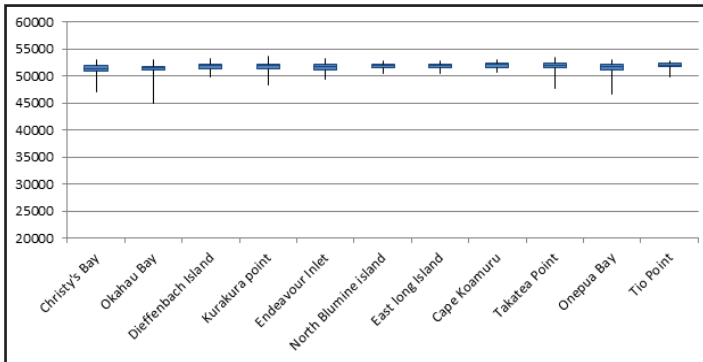


Figure 2: Conductivity ($\mu\text{s}/\text{cm}$) at sites in Queen Charlotte Sound/Totaranui between 2015-19..

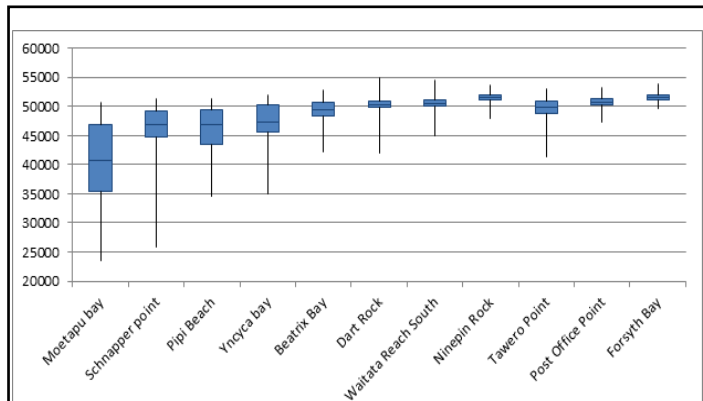


Figure 3: Conductivity ($\mu\text{s}/\text{cm}$) at sites in Pelorus Sound/Te Hoiere between 2015-19.

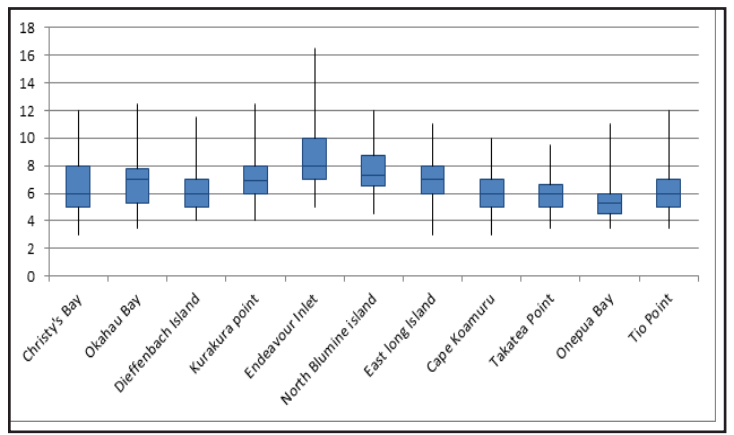


Figure 4 Secchi disc depth (metres) at sites in Queen Charlotte Sound/Totaranui between 2015-19.

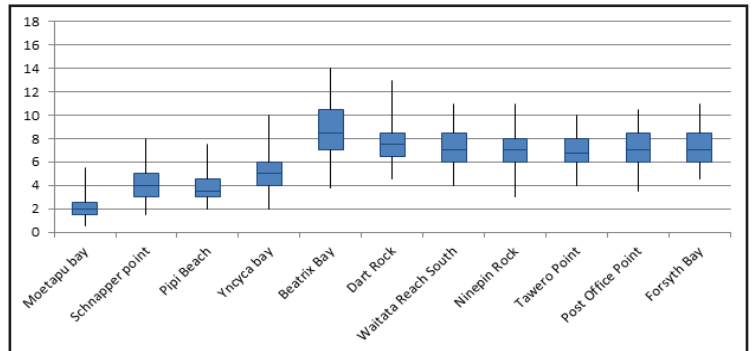


Figure 5: Figure 5: Secchi disc depth (metres) at sites in Pelorus Sound/Te Hoiere between 2015-19.

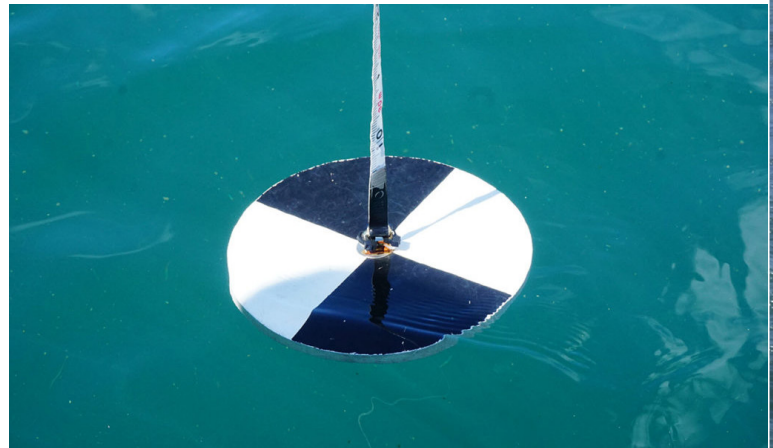


Figure 6: Secchi Disk

The water quality of the Sounds is intimately related to both adjacent terrestrial and oceanic conditions. The Council coastal water quality state of the environment monitoring programme generates a valuable long term data set from which environmental managers can understand the state and trend of water quality in the Marlborough Sounds.