

# Water quality state and trends for Southland

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## Background

Environment Southland will be facilitating community conversations to affirm freshwater values and set water quality limits, to support national and regional objectives for water quality. To provide context and improve our communities understanding of the current state and threats to their waterways, state and trend analysis has been completed on 61 state of environment monitoring stations in Southland.

## Method

State was assessed against the national objectives framework (NOF) for nitrate toxicity, secondary contact recreation and slime algae (periphyton). Periphyton was assessed by examining the distribution of historical annual measurements (2000 – 2014) using Snelder et al. (2013). The mean periphyton cover for a site was used to estimate the 92<sup>nd</sup> and 84<sup>th</sup> percentile following the exponential distribution and to then assign the grading for default and productive stream classes respectively.

Macroinvertebrate Community Index (MCI) scores were included. Break points for each attribute are summarised in Table 1.

Trends were summarised from the Land, Air, Water Aotearoa (LAWA) website for nitrogen, phosphorus, *E.coli* and turbidity for the period 2003-2013.

Trends were not analysed for parameters where either  $\geq 10\%$  of monthly observations were absent or  $\geq 30\%$  of monthly observations were beyond detection limit.

## Summary

Water quality limits will be set for Southland rivers, to protect national and regional values in freshwater. Preliminary reporting identifies several rivers and tributaries that fail (or are predicted to fail) a national bottom line for secondary contact recreation and/or periphyton.

For phosphorus, turbidity and ammonia, the predominant trend is either decreasing or indeterminate. Concentrations of total nitrogen and total oxidised nitrogen are increasing at 39% and 42% of sites respectively. Continued increases in nitrate concentration at locations currently in the C band in the Maitaura and Oreti FMU risk breaching ecosystem health toxicity national bottom lines in the future.

To support the limit setting process, it is essential that the community is well informed of the state of water resources, i.e. "does the water quality support community identified uses and objectives?" and that trend information is used to understand if changes to state pose a threat or alternatively how long it may take until an objective is achieved.

References: Snelder, T; Booker, D; Quinn, J; Kilroy, C (2013). Predicting periphyton cover frequency distributions across New Zealand's rivers. *Journal of the American Water Resources Association* 50(1): 1-17.

## Results

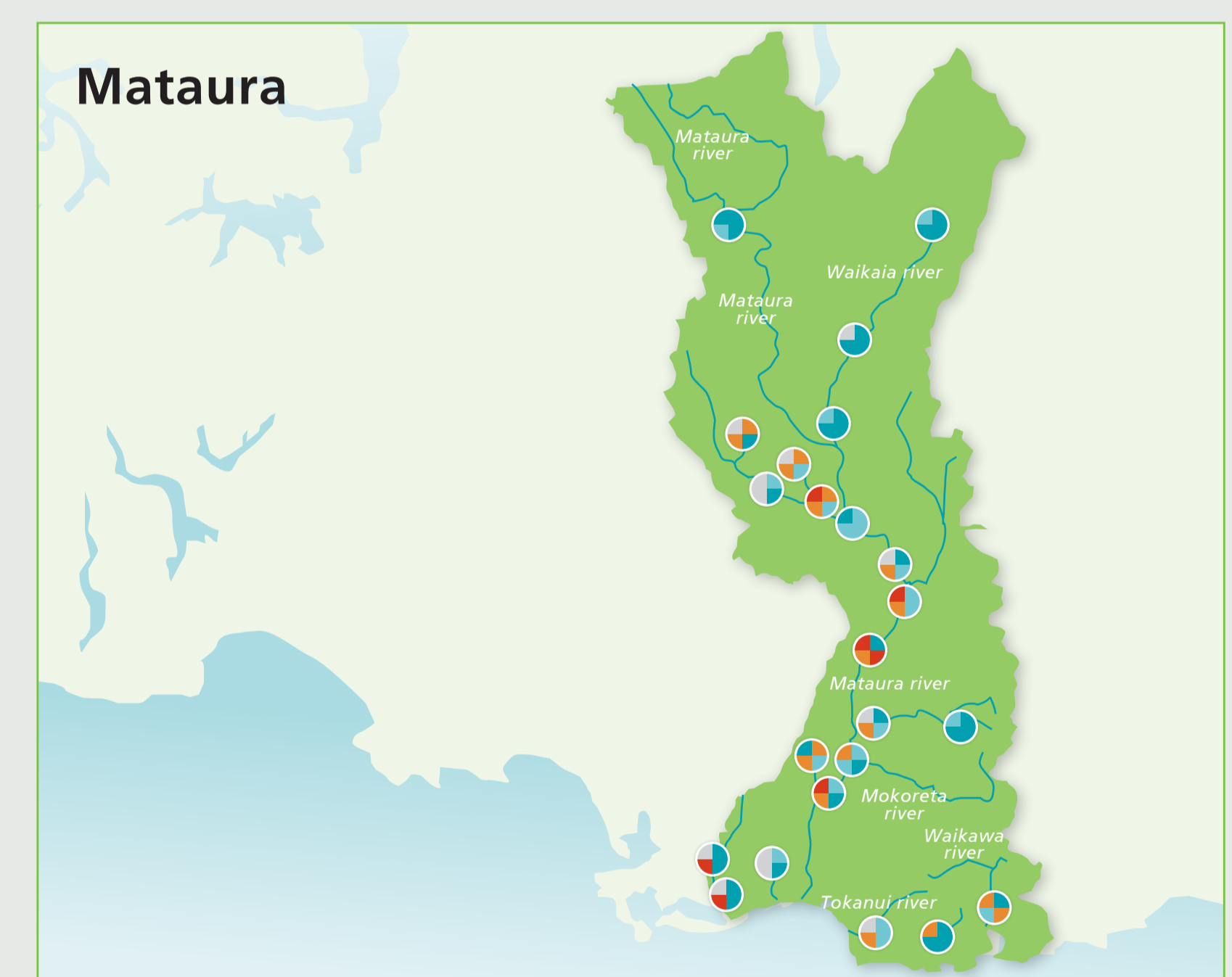
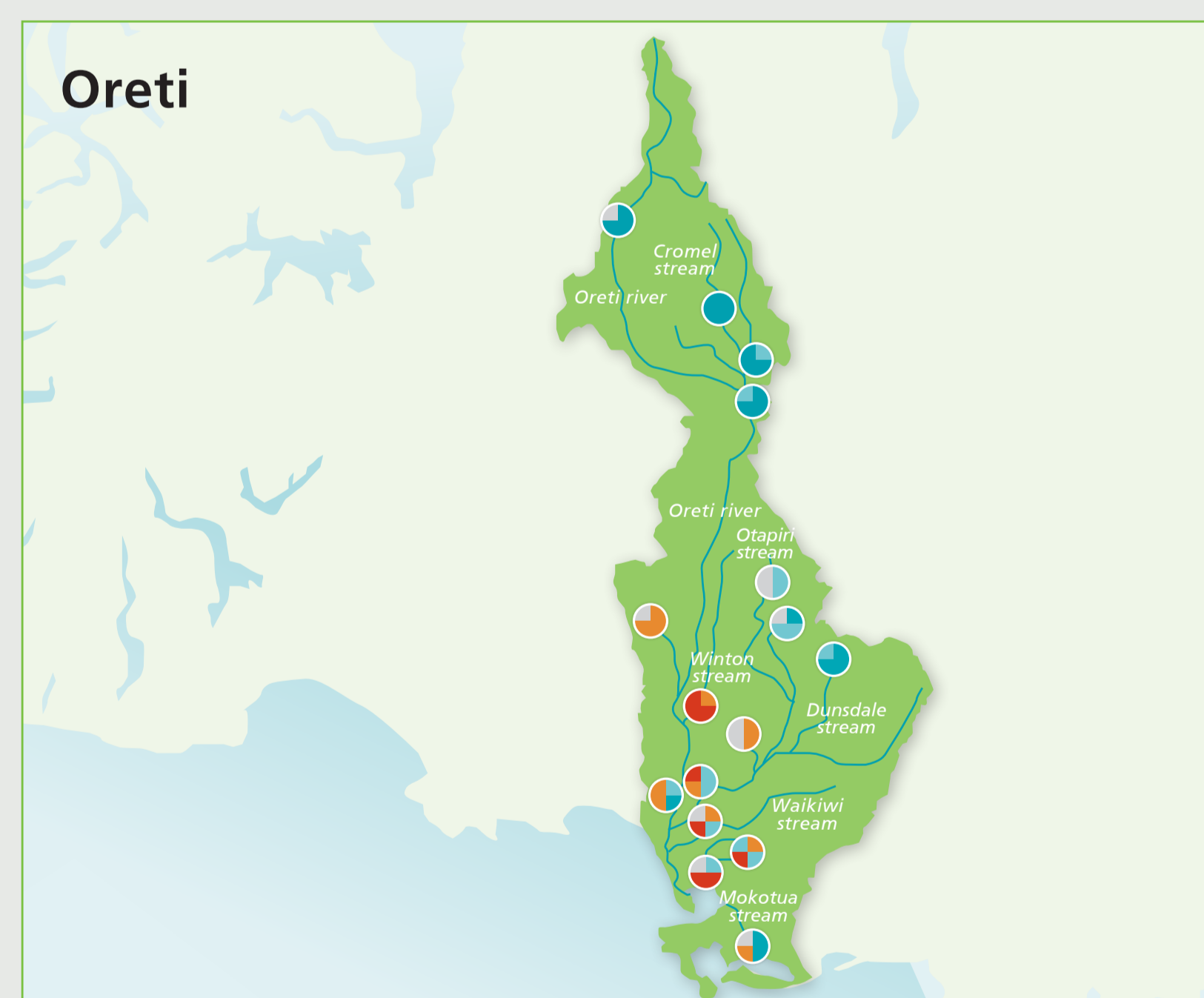
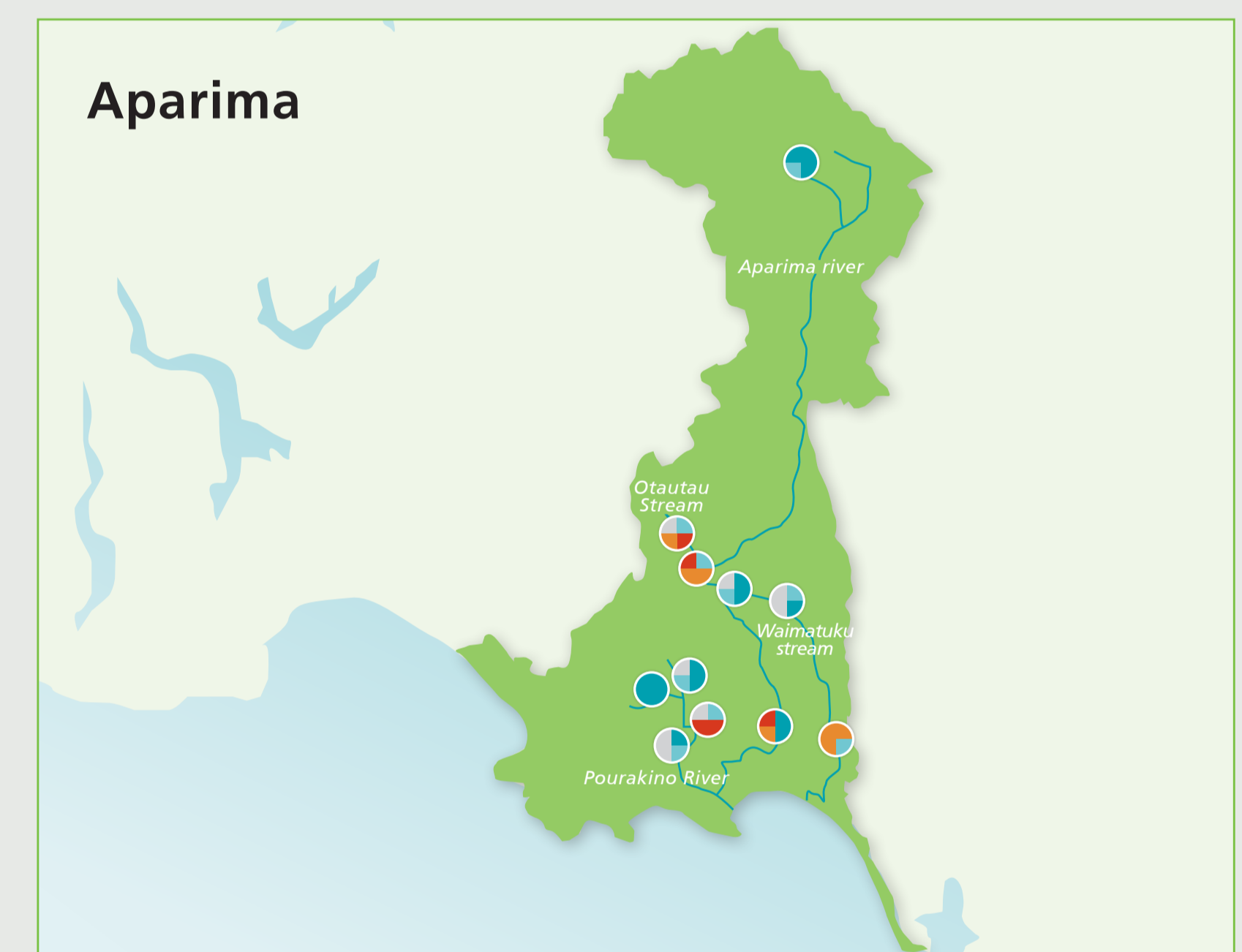
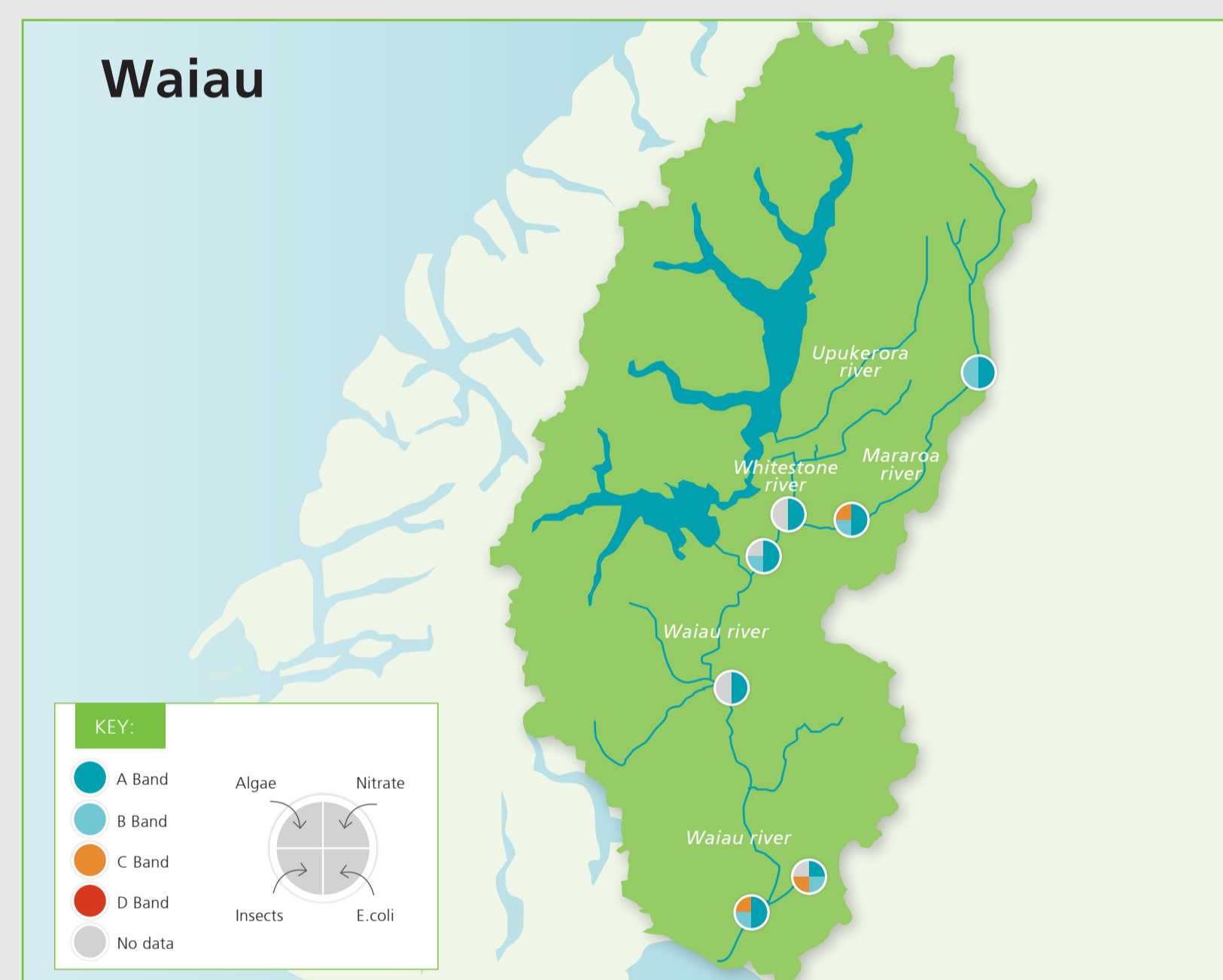
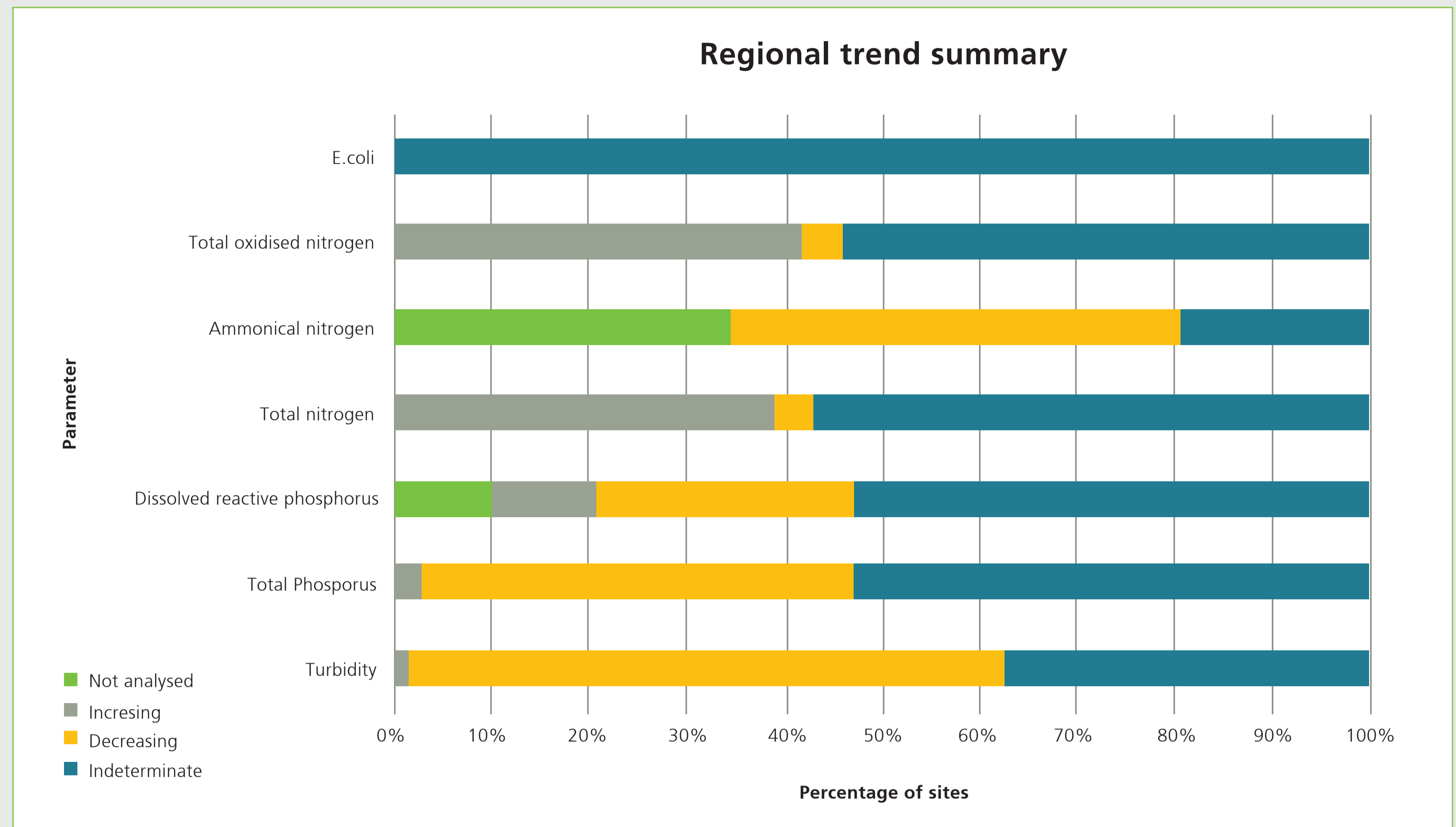


Table 1

Band	Slime Algae (mg chl-a/m <sup>2</sup> ) *, #	Nitrate (mg/l) **	E.coli (E.coli/ 100ml) **	Insect ***
A Band	≤50	≤1	≤260	>119
B Band	>50 and ≤120	>1 and ≤2.4	>260 and ≤ 540	100-119
C Band	>120 and ≤200	>2.4 and ≤6.9	>540 and ≤ 1000	80-99
D Band	>200	>6.9	>1000	<80

\*No more than 8% or 16% of samples or time can slime algae be greater than the threshold in the default class and productive class respectively. # 2004-2014. \*\*median concentration July 2009-2014. \*\*\*median score 2009-2014, if n>3.