

Scarsbrook presented water quality trends for the seven NIWA water quality sites in the Region (Table 3)<sup>18</sup>. These show, for five out of seven of the sites, that there are no trends for nitrate over this shorter period, and for two sites in the lower Manawatu River, nitrate has improved in the shorter term. These lower Manawatu sites are not target zones for the proposed rules around intensive farming. Dr Scarsbrook’s table contains one improving trend for nitrogen related parameters in a target zone. This is at a single site and is for NH4-N, which is more typically associated with direct discharges of effluent to water.

137. It is concluded that Dr Scarsbrook’s assertions, that short-term improvements are a reason not to control agriculture, are not supported by the data set on which he based these conclusions. The data set he used contained only two sites that were in the zones targeted by the proposed Rule 13-1, and the one improving trend was for a parameter more often associated with direct discharges to water bodies. Further, the lack of deteriorating trends demonstrated does not imply that relative contributions of nutrient loads from agriculture are not increasing. The lack of trends could be attributable to similar conclusions to those by (Scarsbrook, 2006, and Ballantine and Davies-Colley, 2009a) regarding national water quality trends (ie. that gains in management of point sources are being overshadowed by increasing inputs from diffuse sources). However, a detailed analysis of the cause of underlying reasons for trends has not been undertaken.

**Table 3:** Trends at seven National Rivers Water Quality Network sites in the Manawatu-Wanganui Region over the last 10 years (1999-2008). The arrows show the direction of change in each parameter (median sen slope for flow-adjusted data), with statistically significant trends (P<0.05; Seasonal Kendall Trend test on flow-adjusted data) shown as arrows. Green arrows indicate improving trends. “NS” = not statistically significant. Trend analysis carried out in TimeTrends 2.0 ([www.niwa.co.nz](http://www.niwa.co.nz)). Modified from the Evidence in Chief of Dr Scarsbrook (Table 1, page 20) with highlighting to show sites in target catchments.

Site	Turbidity (NTU)	Clarity (m)*	DRP (mg/m <sup>3</sup> P)	TP (mg/m <sup>3</sup> P)	NOx-N (mg/m <sup>3</sup> N)	NH4-N (mg/m <sup>3</sup> N)	TN (mg/m <sup>3</sup> N)
Whanganui @ Te Maire	↓	NS	↓	NS	NS	NS	NS
Whanganui @ Paetawa	↓	NS	NS	NS	NS	NS	NS
Rangitikei @ Mangaweka	NS	NS	↓	NS	NS	↓	NS
Rangitikei @ Kakariki	NS	NS	↓	NS	NS	↓	NS

<sup>18</sup> Presented in a modified format to clearly show zones that are targeted by the proposed nutrient management rule.

Site	Turbidity (NTU)	Clarity (m) *	DRP (mg/m <sup>3</sup> P)	TP (mg/m <sup>3</sup> P)	NOx-N (mg/m <sup>3</sup> N)	NH4-N (mg/m <sup>3</sup> N)	TN (mg/m <sup>3</sup> N)
Manawatu @ Weber Rd	NS	NS	↓	↓	NS	NS	NS
Manawatu @ Teachers College	NS	NS	↓	NS	↓	↓	↓
Manawatu @ Opiki	NS	NS	↓	NS	↓	NS	↓

138. A more complete description of long-term and short-term trends was provided by the broader water quality data set analysed by Ballantine and Davies-Colley (2009b)<sup>19</sup>, which was summarised in Mrs McArthur's corrected supplementary evidence Table 3 (and Table 4 below<sup>20</sup>).
139. Ballantine and Davies-Colley (2009b) trend analysis for SIN and DRP reported no trend at the majority of sites, regardless of whether the site was in or out of a target catchment, or analysed over long-term or short-term. The implication of no trend results is that water quality has neither improved nor degraded over the period analysed. In the target catchments, one significant degrading SIN trend was detected, at the Manawatu at the Weber Road site; however, the short-term trend analysis at that site showed no trend.
140. In the target zones, the Ballantine and Davies-Colley (2009b) analysis showed four sites with improving trends for SIN for the short-term analysis. One of these sites, Mangawhero at Department of Conservation Headwaters, is a reference site in a national park and shows significant improving trends for SIN over both the long-term and short-term record. The other three sites with improving trends over the short-term all have no trend over the long-term. This indicates water quality has not changed over the approximately 19 year period, despite more recent trends showing improvement.

<sup>19</sup> As summarised in Mrs McArthur's corrected Table 3 (supplementary evidence) and provided in a modified format to clearly show zones that are targeted by the proposed nutrient management rule.

<sup>20</sup> Provided in a modified format in Table 4 to clearly show zones that are targeted by the proposed nutrient management rule.