

Clear Lake Report 2010

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Clear Lake Historical Data Analysis

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2010

4.4 Secchi depth and Turbidity

Secchi depth increased rapidly in 1990 from an annual average (April - October) of 1.1 ± 0.31 m from 1969 - 1989 to 2.2 ± 0.52 m afterwards (1990 - 2008). The positive trend ($\tau = 0.37$, $p < 0.001$) was consistent across all 3 sampling locations (Fig. 4.11). Secchi depth increased significantly in all months except July and August (Fig. 4.12). Figure 4.13 shows a comparison of annual averaged Secchi depth in May and August, illustrating the increase in spring and consistent Secchi depth in August. Detailed monthly Secchi depth readings are shown in the Appendix.

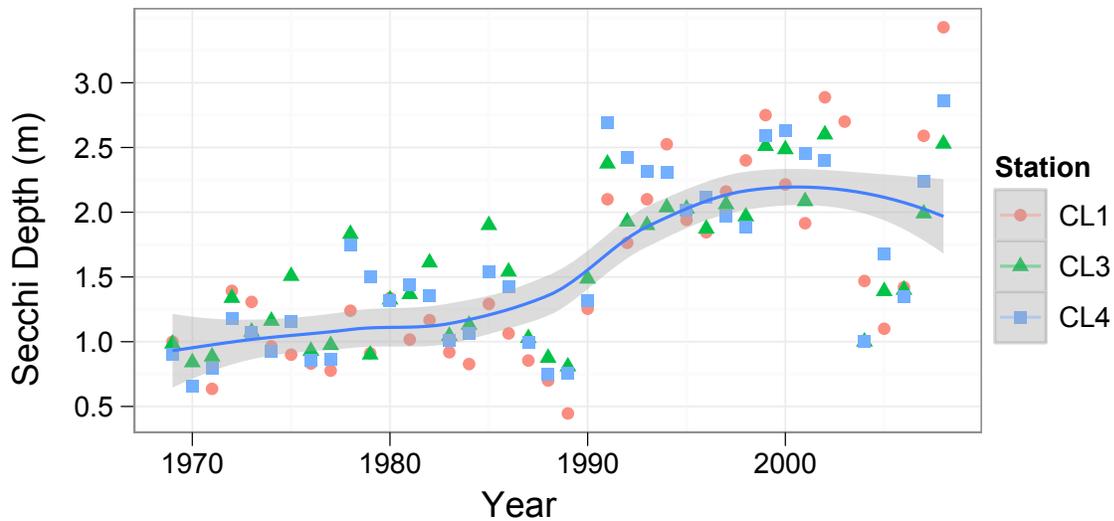


Fig. 4.11. Annual average Secchi depth (April - October) for each sampling station in Clear Lake from 1969 - 2008. Blue line displays a loess fit \pm standard error (grey area) across all sampling station. See Appendix for detailed monthly Secchi depth readings.

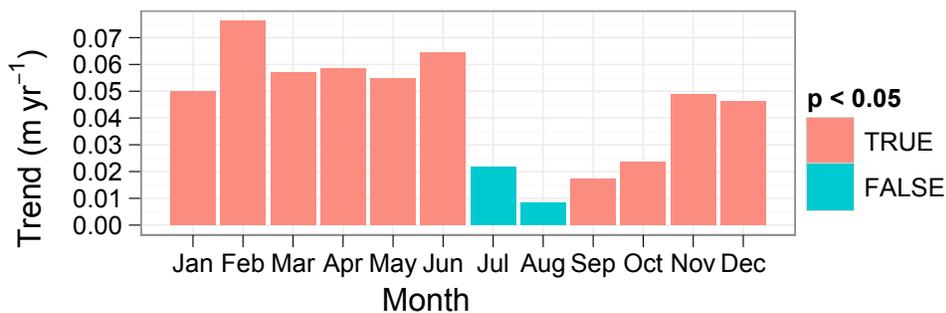


Fig. 4.12. Trend statistics for Secchi depth for each month representing the Sen’s slope.

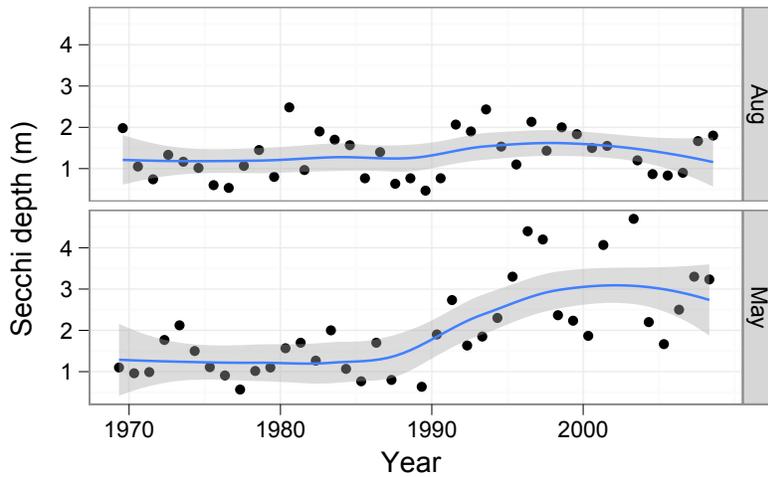


Fig. 4.13. Secchi depth in May and August across all 3 sampling stations illustrating the increasing trend in spring, whereas Secchi depth did not show a significant change in August throughout the sampling period.

Clear Lake is a turbid system due to inorganic suspended particulate matter in the winter and algal blooms in the summer. Turbidity decreased significantly ($\tau = -0.45$, $p < 0.001$) over the last 40 years (Fig. 14). The downward trend is largely due to high turbidity in the early 1970s according to the DWR data record.

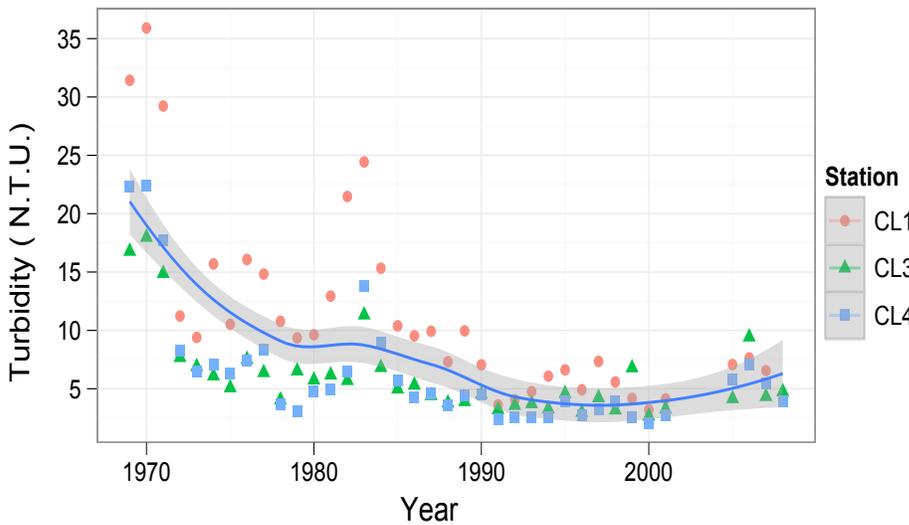


Fig. 4.14. Annual averaged (April - October) turbidity for all 3 sampling stations in Clear Lake from 1969 - 2008 (DWR data).

Turbidity measured by the Vector Control Data show a decline in the early 1980s and turbidity remained at a low level since 1990s (Fig. 4.15). Overall turbidity decreased significantly at both depth (surface: $\tau = -0.62$, $p < 0.0001$; bottom: $\tau = -0.64$, $p < 0.0001$)

and in all months of the year (Fig. 4.16), contrary to Secchi depth, with did not increase in July and August. See Appendix for long-term seasonal turbidity values.

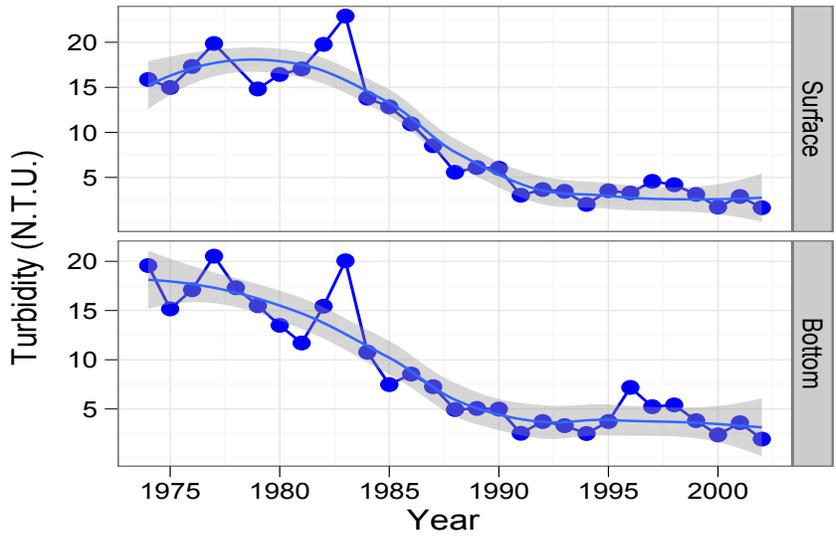


Fig. 4.15. Vector Control Data: Annual averaged turbidity for all 3 sampling stations (R3S5, R4S9, R5S13) in Clear Lake from 1969 - 2002.

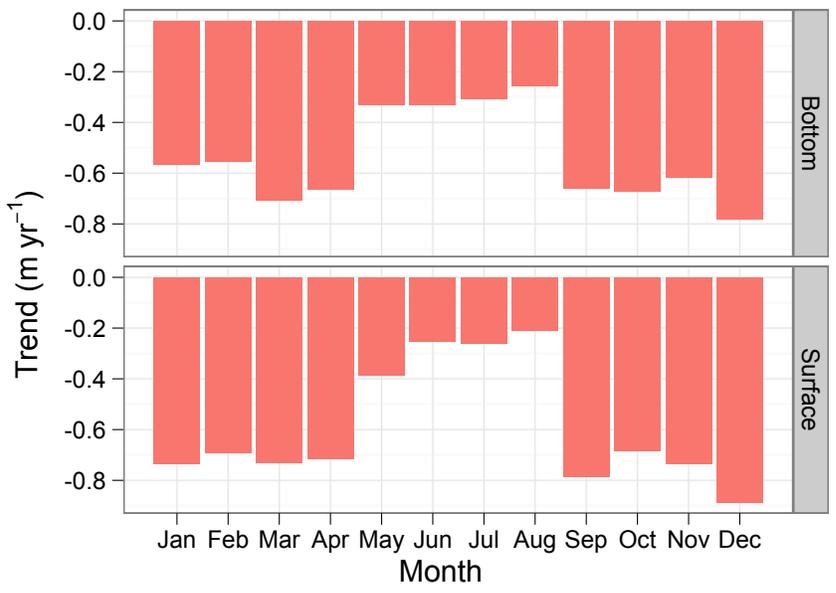


Fig. 4.16. Vector Control Data: Trend statistics of monthly-averaged turbidity across all 3 sampling stations (R3S5, R4S9, R5S13) in Clear Lake from 1969 - 2002.

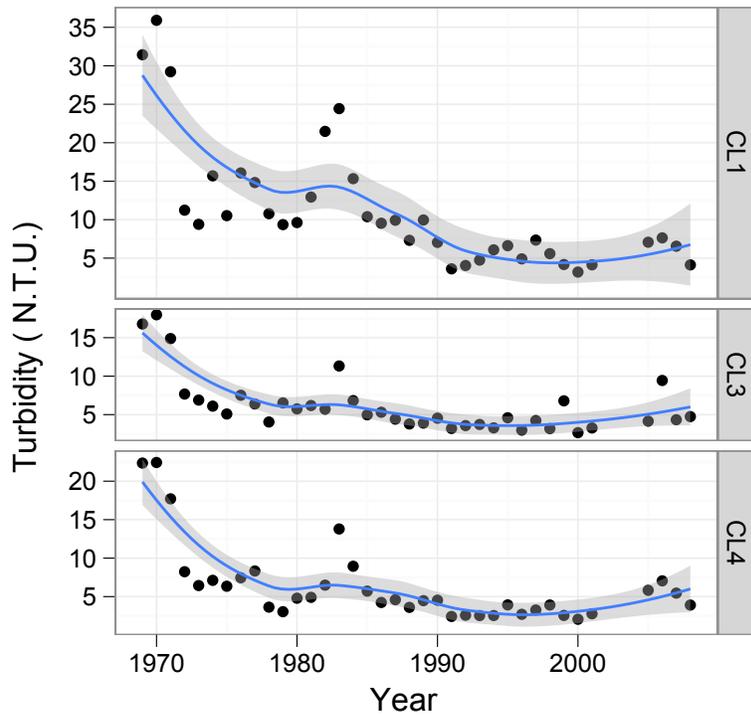


Fig. S6. Annual-average (April - October) turbidity by stations in Clear Lake between 1969 and 2008.

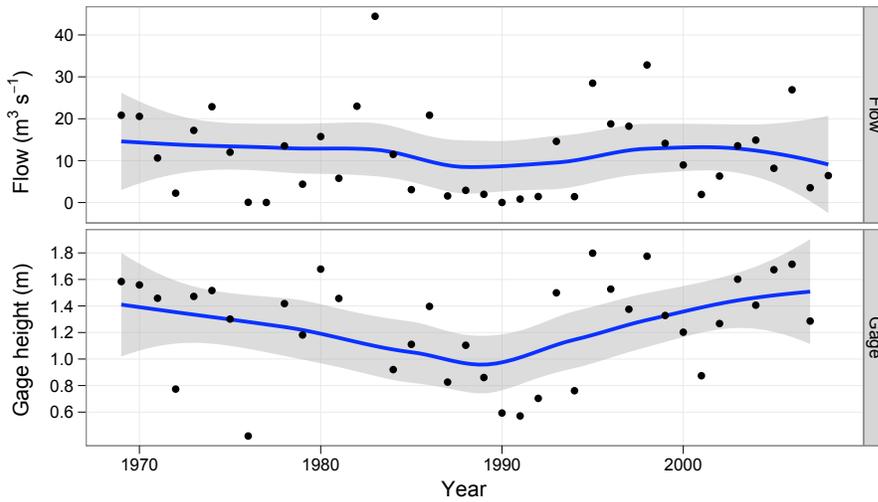


Fig. S7. Annual average of outflow of Cache Creek near Lower Lake and lake surface level (Gage height) from Clear Lake during the monitoring sampling program (1968 - 2008).