Trends in the Quality of Streams in New Jersey Over Water Years 1971-2011

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Trends in values of three nutrients (total nitrogen, filtered nitrate plus nitrite, and total phosphorus) were determined over selected time periods during water years 1971-2011 at 28 stations on streams in New Jersey. Trends in three measures of ion chemistry (specific conductance, filtered chloride, and total dissolved solids) were determined at 4 stations in the Delaware River Basin.

Two methods were used to identify trends – WRTDS models and seasonal rank-sum tests. WRTDS (‘Weighted Regression on Time, Discharge, and Season’) models identified trends at the 22 stations for which a record of daily flow was measured or could be estimated. Trends were determined in both flow-normalized annual concentration and in flow-normalized annual flux (load per unit time) over two periods – water years 1980 to 2011 and water years 2000 to 2011.

Seasonal rank-sum tests identified step trends between water-quality values measured in each decade of the period of study – the 1970s, 1980s, 1990s, and 2000s. Step trends in nutrient concentrations were determined at each of the 28 stations; step trends in values of the measures of ion chemistry were determined at the 4 selected stations.

A combined set of trend test results for the period, water years 1980-2011, was created from the results of both methods. Results of the trend tests in flow-normalized concentrations from WRTDS models were included, if available; otherwise, results of tests for step trends between the 1980s and the 2000s were included. Concentrations of total nitrogen and total phosphorus at most of the 28 stations showed either no change or decreased. Concentrations of total nitrogen decreased, showed no change, and increased at 11, 15, and 2 stations, respectively. Concentrations of total phosphorus decreased, showed no change, and increased at 14, 13, and 1 station, respectively.

Trends in nutrients were determined at 6 stations in the basins of the Passaic, Hackensack, and Saddle Rivers. Over water years 1980-2011, concentrations of total nitrogen and total phosphorus at these stations either decreased or showed no change.