Abstract

Water-quality and streamflow data collected in the Minnesota River Basin during 2000 - 03 were examined and evaluated to determine the condition of 28 tributary streams and the Minnesota River mainstem with respect to concentrations, loads and yields of total suspended solids, total phosphorus, orthophosphorus, nitrate-nitrogen, pesticides, and bacteria. The data show widely varying water-quality conditions in most streams during a relatively short four-year monitoring period, underscoring the need for longer-term data gathering to gain an accurate perspective of water quality across a broad spectrum of hydrologic conditions. Results show that watershed yields of water-quality constituents follow a general pattern of increasing yield, often accompanied by increasing flow-weighted mean concentrations, from west-to-east across the Minnesota River Basin. The data indicate regional differences in the magnitude of constituent load response to water runoff. The difference in response is related to watershed soils, geology, topography, and stream morphology, but land use, cropping practices, drainage practices, and conservation practices also may be affecting the load response. Concentrations of total suspended solids, total phosphorus, orthophosphorus and nitrate-nitrogen in several of the monitored streams, despite reductions during 2003, frequently are at problematic levels, exceeding thresholds associated with reasonable expectations for water quality in their respective ecoregions. Affected streams range in size from minor tributaries to the Minnesota River mainstem. Impaired conditions were documented during widely varying hydrologic conditions ranging from near drought to flood. The data gathering, using consistent and technically-sound methodology at all sites across the Minnesota River Basin, serves to document present stream condition and provides a basis for directing resources to impaired streams. Such data, collected longer term, will form a solid body of evidence that accurately portrays stream water quality over time. These data will enhance the impaired waters listing process by providing an improved perspective of stream water quality during normal, above normal, and below normal runoff periods. During the four-year period, the monitoring data have served to identify impaired streams and have provided indications of source areas, but questions remain about specific contaminant sources, source mobilization, and transport mechanisms. The more complex mechanisms may require in-depth focused research studies beyond the scope of the present monitoring program and suggestions for research projects are presented in this report.