

Illinois River at Valley City, Illinois

Flow-Normalized Nitrate Concentration and Flux

FN nitrate concentration and flux decreased (–14 percent) at Illinois River at Valley City, Illinois (ILLI-VC) from 1980 to 2010 (table 2). FN nitrate was relatively stable from 1980 through 2000, and considerable decreases in FN nitrate were observed from 2000 through 2010 (–21 percent for concentration and –25 percent for flux; fig. 6). FN nitrate concentration was high in 1980 (approximately 4 mg/L), second only to the concentration in the Iowa River (IOWA-WAP).

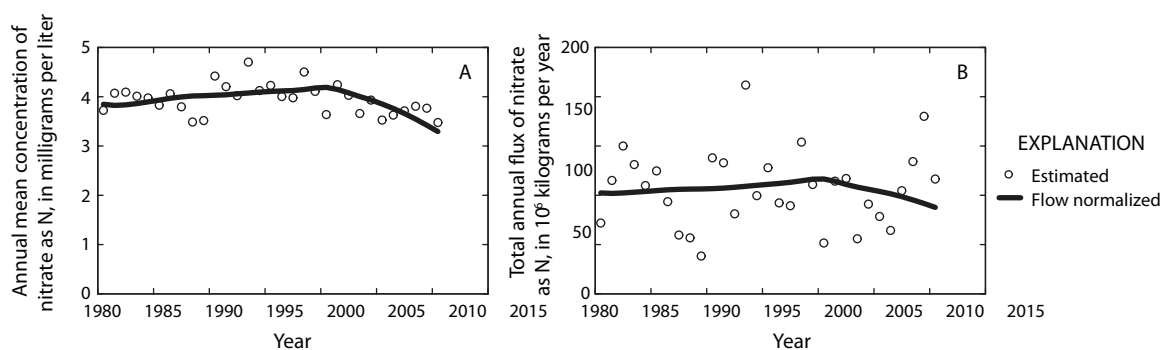


Figure 6. (A) Annual mean estimated concentration (circles) and flow-normalized concentration (solid line) and (B) total annual estimated flux (circles) and flow-normalized flux (solid line) from 1980 through 2010 for the Illinois River at Valley City, Illinois (ILLI-VC).

Comparison of Nitrate Concentrations over Time and with Streamflow

Nitrate concentration decreased considerably across all streamflows from 2000 through 2010 at Illinois River at Valley City, Illinois (ILLI-VC). The greatest decreases in nitrate, as much as 2 mg/L, occurred during high streamflows across the entire year, and decreases during moderate and low streamflows were also substantial (approximately 0.5 mg/L; fig. 7). The highest nitrate concentrations continue to occur during the winter and spring under high streamflow conditions, though they are becoming less severe over time. Declining nitrate concentrations during high flows may indicate that conservation efforts to reduce nitrogen losses in runoff from farm fields are achieving results (Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 2011; U.S. Department of Agriculture, Natural Resources Conservation Service, 2012). Additionally, reductions at low flows in the Illinois River suggest legacy nitrate may be less influential in this subbasin as compared to the Iowa River (IOWA-WAP) or that point source discharges to the Illinois River have changed over the past decade. Another possible explanation for the overall reduction in nitrate is the 2006 completion of a 109 mile, large-diameter, underground, tunnel system throughout the Chicago metropolitan area that is used to capture and treat combined sewer overflow which would otherwise be discharged directly (untreated) to local rivers (Metropolitan Water Reclamation District of Greater Chicago, 2013).

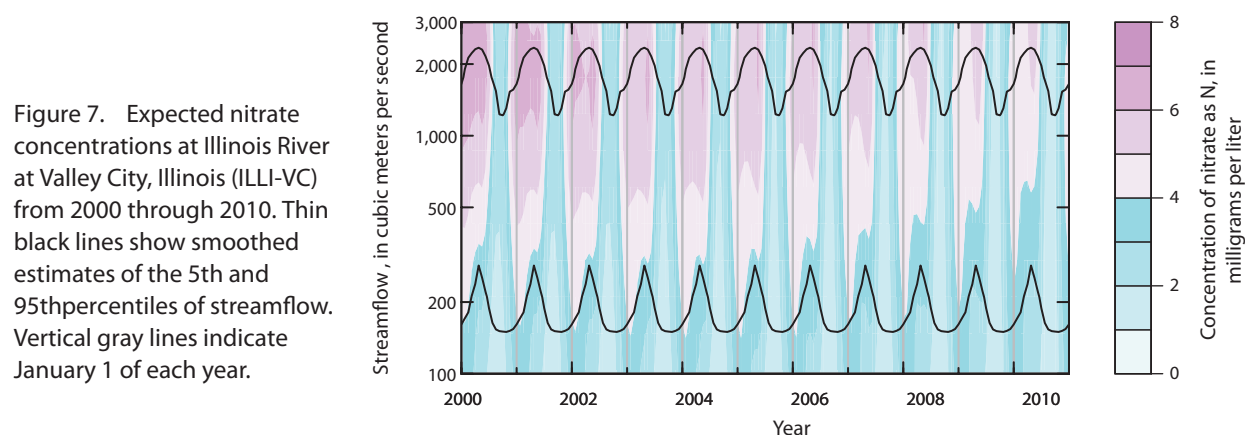


Figure 7. Expected nitrate concentrations at Illinois River at Valley City, Illinois (ILLI-VC) from 2000 through 2010. Thin black lines show smoothed estimates of the 5th and 95th percentiles of streamflow. Vertical gray lines indicate January 1 of each year.