

Iowa River at Wapello, Iowa

Flow-Normalized Nitrate Concentration and Flux

FN nitrate concentration and flux decreased (–11 and –15 percent, respectively) from 1980 to 2010 at Iowa River at Wapello, Iowa (IOWA-WAP). FN nitrate was generally stable until early 2000 and then declined slightly through 2010 (fig. 4). In 1980, this site had the highest FN nitrate concentration of any study site (approximately 5 mg/L); even though FN nitrate is decreasing at this site, concentrations still remain higher than at any other site.

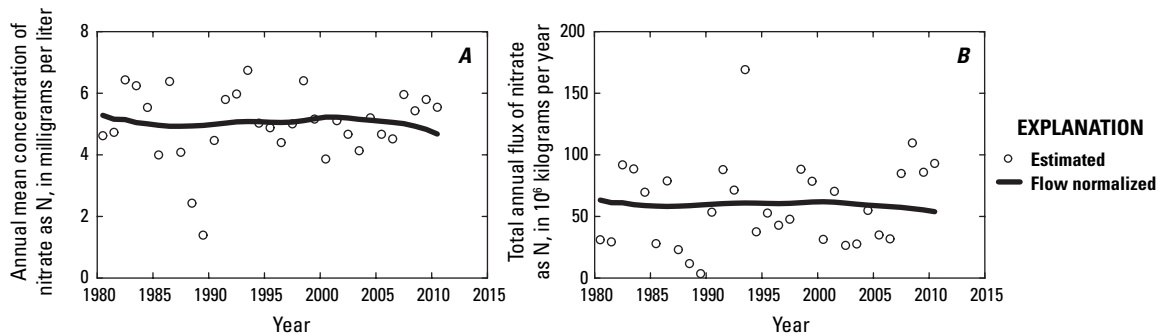


Figure 4. (A) Annual mean estimated concentration (circles) and flow-normalized concentration (solid line) and (B) total annual estimated flux (circles) and flow-normalized flux (solid line) from 1980 through 2010 for the Iowa River at Wapello, Iowa (IOWA-WAP).

Comparison of Nitrate Concentrations over Time and with Streamflow

From 2000 through 2010, nitrate concentration at Iowa River at Wapello, Iowa (IOWA-WAP) decreased by about 1 to 2 mg/L at moderate and high streamflows across all seasons (fig. 5). Two pulses of elevated nitrate concentrations, centered around the months of May and November of each year, are distinct in the early 2000s but become less prominent over time. This finding suggests a reduction in nitrogen losses from farm fields during high streamflow conditions associated with fall and spring fertilizer application periods and may be related to conservation practices that have been implemented in the State of Iowa during the past decade (Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 2011). However, increases of about 1 mg/L also occurred at low streamflows during the winter and spring, which, at least during the spring, may partly offset decreases in concentration and result in minimal change of average spring concentration during 2000–2010 (table 4). Increases in nitrate concentration during low flows at this site and others may be because of legacy nitrate from groundwater, which could continue to influence base-flow concentrations for decades (Tesoriero and others, 2013).

Figure 5. Expected nitrate concentrations at Iowa River at Wapello, Iowa (IOWA-WAP) 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.

