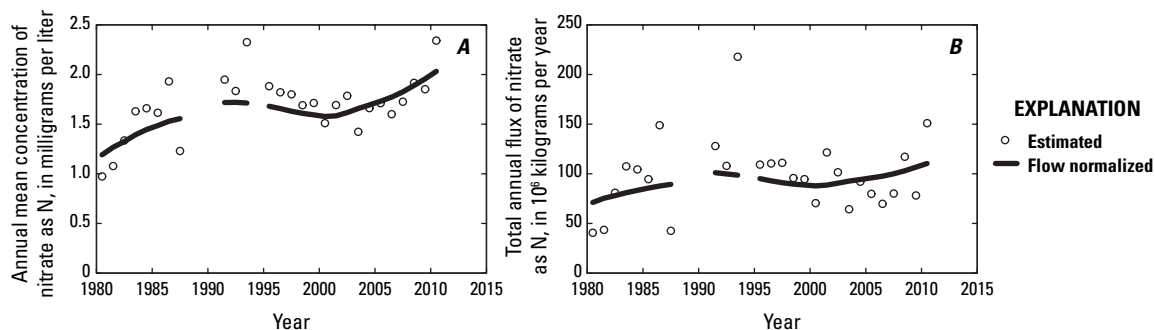


## Mississippi River at Clinton, Iowa

### Flow-Normalized Nitrate Concentration and Flux

From 1980 to 2010, the largest percentage increase in FN nitrate flux (55 percent) occurred at Mississippi River at Clinton, Iowa (MSSP-CL), and increases in FN nitrate concentration (70 percent) were comparably large (table 2). FN nitrate concentration was low in 1980 (approximately 1 mg/L), but FN concentrations have generally increased to more than 2 mg/L during the following three decades (fig. 2). FN nitrate concentration increased by approximately 0.5 mg/L between 1980 and 2000 and again between 2000 and 2010, though concentration generally changed little between 1990 and 2000.



**Figure 2.** (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 Mississippi River at Clinton, Iowa (MSSP-CL).

### Comparison of Nitrate Concentrations over Time and with Streamflow

At Mississippi River at Clinton, Iowa (MSSP-CL), between 2000 and 2010, nitrate concentrations increased by approximately 1 mg/L across all streamflows during the winter and spring yet changed little during the summer and fall (fig. 3). Increasing concentration during the winter and spring coincides with an overall increase in annual FN nitrate of about 0.5 mg/L, from 2000 through 2010 (table 3). The highest nitrate concentrations at MSSP-CL consistently occur during the highest streamflows in the winter and appear to increase in intensity over time.

**Figure 3.** Expected nitrate concentrations at Mississippi River at Clinton, Iowa (MSSP-CL) 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.

