

Mississippi River above Old River Outflow Channel, Louisiana

Flow-Normalized Nitrate Concentration and Flux

FN nitrate concentration and flux have increased slightly during 1980–2010 (17 and 14 percent, respectively; table 2) at Mississippi River above Old River Outflow Channel, Louisiana (MSSP-OUT). During this time, annual mean FN nitrate concentrations ranged from 1.2 to 1.5 mg/L. During 1980–2000, nitrate changed little, whereas from 2000 onward, FN nitrate concentration and flux increased slightly by 12 and 10 percent, respectively (fig. 16). The recent increase in FN nitrate concentration and flux at MSSP-OUT indicates that even though decreases in FN nitrate concentration have been observed at smaller subbasins with historically elevated nitrate (IOWA-WAP and ILLI-VC), these decreases appear to be offset by increases in nitrate from other areas of the basin, such as the upper Mississippi River (MSSP-CL), the Missouri River (MIZZ-HE), and the intervening basin above MSSP-OUT. The recent upturn in FN nitrate concentration and flux at MSSP-OUT may not develop into a sustained increasing trend; however, the upturn does suggest that conditions within the MRB are likely changing and how this trend develops in the coming years will have important management implications.

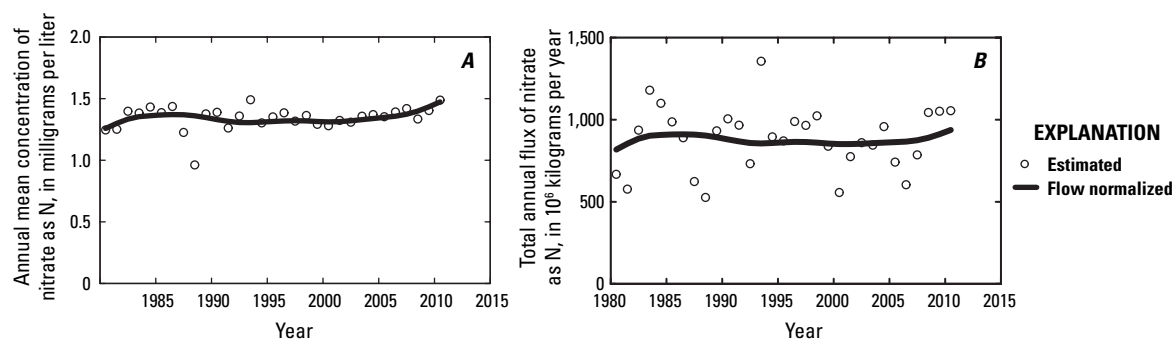


Figure 16. (A) Annual mean estimated concentration (circles) and flow-normalized concentration (solid line) and (B) total annual estimated flux (circles) and flow-normalized flux (solid line) from 1980 through 2010 for the Mississippi River above Old River Outflow Channel, Louisiana (MSSP-OUT).

Comparison of Nitrate Concentrations over Time and with Streamflow

Since 2000, nitrate concentration has increased slightly across a range of streamflows and seasons at Mississippi River above Old River Outflow Channel, Louisiana (MSSP-OUT). During the fall and winter, nitrate increased slightly (less than 0.5 mg/L) across all streamflows (fig. 17). Nitrate also increased during the spring, by about 1 mg/L, at low streamflows. These increases in nitrate appear to be partly offset by slight decreases (less than 0.5 mg/L) at moderate and high streamflows in the summer. The highest nitrate concentrations typically occur during low and moderate streamflows in April and May. Increases in nitrate concentration during low streamflows at this site and at many other sites in the MRB (except ILLI-VC and OHIO-GRCH) suggest that contributions from point sources, such as wastewater treatment plants, or legacy nitrate from groundwater are becoming important influences throughout the basin as a whole, even as concentrations have decreased in intensely farmed subbasins, such as the Iowa (IOWA-WAP) and Illinois (ILLI-VC) Rivers, which historically have been important contributors of nitrogen (Goolsby and Battaglin, 2001).

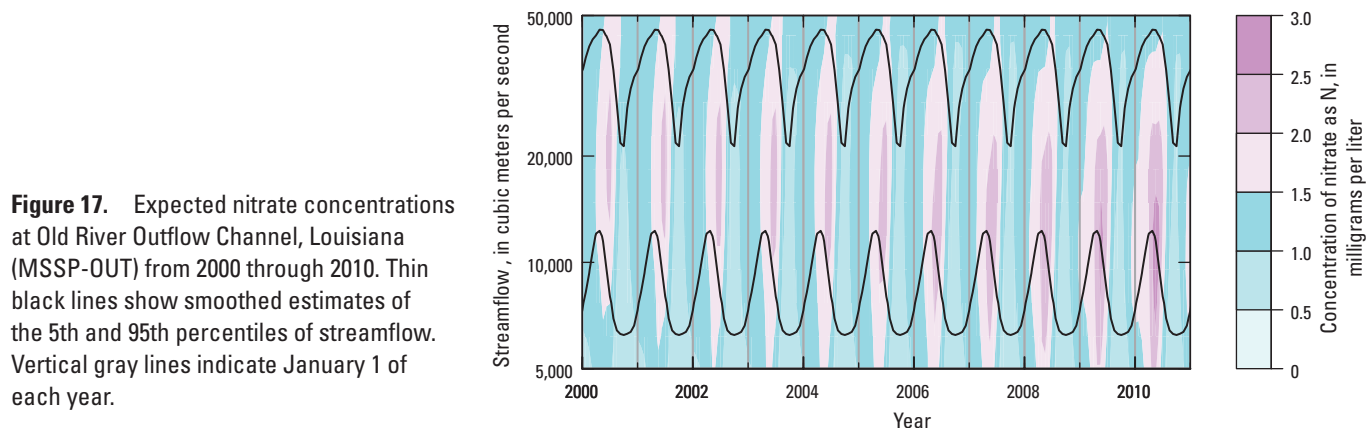


Figure 17. Expected nitrate concentrations at Old River Outflow Channel, Louisiana (MSSP-OUT) from 2000 through 2010. Thin black lines show smoothed estimates of the 5th and 95th percentiles of streamflow. Vertical gray lines indicate January 1 of each year.