

Report for 2005AR90B: Effect of Reduced Effluent Phosphorus Concentrations at the Illinois River, Northwest Arkansas

Publications

- Articles in Refereed Scientific Journals:
 - Haggard, Brian E., 2006, Effect of Reduced Effluent Phosphorus Concentrations at the Illinois River, Northwest Arkansas, Journal of Environmental Quality, in preparation.

Report Follows

Problem and Research Objectives

Recently, the main municipal effluent discharges into the headwaters of the Illinois River Basin in northwest Arkansas reduced effluent phosphorus concentrations to less than 1 mg per liter on a voluntary basis, except for the City of Fayetteville which is regulated at that level. The research objective of this project was (1) to evaluate the spatial distribution of phosphorus concentrations at the Illinois River drainage area from the effluent discharges downstream to the Arkansas and Oklahoma border near the Illinois River at Arkansas HWY 59, and (2) to evaluate if phosphorus concentrations have changed over the one year study period and also compared to data collected in previous years.

Methodology

The project selected 29 water quality monitoring sites from the Illinois River near the Arkansas and Oklahoma border upstream into Osage, Spring, Clear and Mud Creeks to each municipal effluent discharge from the Cities of Rogers, Springdale and Fayetteville, Arkansas. Water samples were collected approximately monthly from each site, and then analyzed for dissolved phosphorus and total phosphorus using the automated ascorbic acid reduction method on filtered (0.45 μm membrane) and unfiltered-digested (persulfate autoclave method) aliquots.

Principal Findings and Significance

The results clearly showed the marked longitudinal gradient in dissolved and total phosphorus concentrations from the Illinois River near the Arkansas and Oklahoma border upstream to the municipal effluent discharges, particularly from the City of Springdale. Elevated phosphorus concentrations could be traced from the state-line upstream over 47 river km to one effluent discharge. However, it was also apparent that phosphorus concentrations have been changing with time, and the effect of the reduced effluent phosphorus concentrations has been observed downstream near the state-line. With time, the phosphorus concentrations should become even further reduced compared to historical concentrations.