Applying knowledge to improve water quality
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Record-setting Phosphorus Loads from Agricultural Watersheds in Ohio

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Abstract Text:

The 2007 Water Year set the record for the annual load of total phosphorus, and the load for dissolved reactive phosphorus had already surpassed the previous maximum by early March. Both the Sandusky and Maumee Rivers set records, the highest loads observed in more than 30 years of monitoring these rivers. This is true in spite of overall downward trends in sediment and particulate phosphorus concentrations. The sediment loads for 2007 were above average but nowhere near record-setting. The record dissolved phosphorus load is partly a consequence of increasing concentrations in the last decade. However, the major reason for these extreme loads is the weather. The year was one of above-average but not record-setting rainfall (44.8", 129% of the average since 1900), but the most significant factor was that the fall and winter until mid-January were warm, allowing farmers to harvest, plow, fertilize, spread manure, etc. on most fields, tasks that are postponed for many fields until spring in years when cold weather comes earlier. During this time, which in many years is relatively dry, there were frequent rains, which eroded bare soils and leached nutrients out of crop stubble and applied fertilizer and manure. Rainfall for October through January was 173% of the average for this period. Thus the cumulative loads for the year of nutrients and sediment grew rapidly early in the water year, a time when loads are normally not so large. An early summer dry period (May and June) prevented the loads from becoming even larger; rainfall during this time was 31% of average. A very rainy August (9.8", 305% of average) capped this record-setting year, but, because the soils were dry, did not produce as much runoff and additional load as would otherwise have been the case. This year illustrates the extent to which the weather can dominate non-point source nutrient and sediment loading from agricultural watersheds, and demonstrates the need for long-term monitoring to document the success of agricultural BMPs in improving water quality.

Impact Statement:

This project has documented improvements in water quality that stem from 30 years of implementation of ag BMPs, particularly conservation tillage, improved fertilizer management, and filter/buffer strips. It has also documented increases in dissolved phosphorus over the last decade, which appears to be at least in part a consequence of nutrient stratification in the soil as a result of conservation tillage. It has leveraged other grants which will evaluate causes more completely, provide toolkits of new management practices, and bring this information to the farming community.