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Water Quality and Conservation Practices in the South Fork of the Iowa River

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Abstract Text:

Iowa's South Fork watershed is dominated by corn (Zea mays L.) and soybean [Glycine max L. (Merr.)] rotations, and animal feeding operations are common. Artificial subsurface (tile) drainage is extensive; hydric soils cover 54% of the watershed. During spring and early summer, NO3-N concentrations often exceed 20 mg/L (ppm). Total N loads during 2002-2005 ranged from 16-26 kg NO3-N/ha/yr (14-23 lb/ac/yr). Nitrate concentrations increased linearly with log (baseflow), effectively a surrogate measure of tile discharge. Phosphorus loads were only 0.4-0.7 kg P/ha/yr (0.4-0.6 lb/ac/yr), but concentrations commonly exceeded eutrophication-risk thresholds. Mean E. coli populations in the stream exceeded 500 cells/100 mL during summer. Tile drainage is more important in transport of nitrate than E. coli or phosphorus. Variations in nitrate, phosphorus and E. coli are uniquely timed, highlighting the complexity of integrated water quality assessments. An inventory of conservation practices (CP) and farming practices showed 85% of the land in corn (Zea mays L.) and soybean [Glycine max L. (Merr.)] rotations, but only 7% of cropland was managed using no-tillage. About 30% of cropland receives manure annually, prior to corn. Surface residue following soybean was usually inadequate (<30%), indicating a key management challenge. About 90% of fields with >34% highly erodible land (HEL), subject to USDA conservation compliance, indeed had erosion-control practices installed. Grassed waterways and riparian buffers were common edge-of-field practices, and HEL fields near streams often had multiple practices and rotations including third crops. Most conservation practices are aimed at controlling runoff, but tile drainage is the dominant hydrologic pathway.

Impact Statement:

This project documents water quality in a large agricultural watershed and assess the quanity and types of conservation practices.