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MODELING ALTERNATIVE AGRICULTURAL MANAGEMENT PRACTICES FOR HIGH ISLAND CREEK WATERSHED IN SOUTH-CENTRAL MINNESOTA

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ABSTRACT

Nonpoint source pollution from row crop land is a widespread problem in North America. Concerns include sediment, nitrate and phosphorus loadings to water bodies from row cropped lands. In this study, a spatial-process based water quality model was calibrated (2001-2002) for flow, sediment, nitrate and phosphorus losses from the High Island Creek, a 3856 ha agricultural watershed located in south-central Minnesota. The calibrated model was used to evaluate alternative tillage and fertilizer management practices such as adoption of conservation tillage practices, rate, timing and method of N- and P-fertilizer applications, and method of manure application. Statistical comparison of calibration results with observed data indicated excellent agreement with r^2 of 0.95, 0.96, 0.87, and 0.97 for flow, sediment, nitrate and phosphorus losses, respectively. The model simulated a 37.5% reduction in annual sediment losses can be achieved by adopting conservation tillage on all row cropped land in the watershed. Reductions in annual nitrate losses can be achieved by switching the timing of application from fall to spring and by reducing the rate of nitrogen fertilizer application. A 41% reduction in annual nitrate losses can be achieved if all farmers adopt injection as a method for animal manure application.

Reference: *Gowda, P.H. and D.J. Mulla. 2006. Modeling alternative agricultural management practices for High Island Creek watershed in south-central Minnesota. Journal of Environmental Hydrology, Vol. 14, Paper 13.*

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