



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: WI102

Title: A Basin-Scale Denitrification Budget for a Nitrate Contaminated Wisconsin Aquifer

Focus Categories: Nitrate Contamination, Water Quality

Keywords: non-point pollution, water quality, nitrate contamination

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Congressional District: Wisconsin 2nd

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Abstract

The goal of this proposal is to achieve a better understanding of denitrification as a basin-scale control of nitrate concentration and export in Wisconsin aquifers. Our objective is to quantify nitrate losses by denitrification in the Little Plover Basin (LPRB), a nitrate-contaminated basin typical of many in the state. We will focus on three major denitrification mechanisms that control the concentration and export of N in the LPRB aquifer: 1) denitrification in regional groundwater flowpaths that discharge to stream segments with deep hydraulic penetration; 2) denitrification in shallow groundwater flowpaths through riparian soil; 3) denitrification in hyporheic sediments associated with losing stretches of the stream. We will draw upon 1) an extensive sampling infrastructure and database for the groundwater/surface water interface in the LPRB; 2) new quantitative approaches for using the groundwater/surface water interface to study basin scale hydrology and water quality relationships; 3) techniques that provide direct qualitative (e.g., stable isotopes of N and O) and quantitative (excess nitrogen gas) measures of denitrified N; and 4) recently established groundwater discharge and nitrate export budgets that have been linked to basin-wide groundwater flow paths and historical land use patterns. Findings from this study will 1) help resolve hydrogeological and historical controls on the distribution of nitrate contamination; 2) provide insight into evolving trends in groundwater and surface water quality throughout the state; and 3) help define the potential applications of the groundwater/surface water interface to study groundwater quality at the basin scale.