



Title: Potential for nitrogen removal in agricultural headwater streams

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Organization: Ohio State University

State: OH **Region:** Great Lakes

Year of Funding: 2003

Theme: Environmental Restoration

Situation: Agricultural drainage in the upper Midwest has been recognized as a source of excess nitrogen in aquatic ecosystems. Drainage caused the destruction of natural stream morphology and function, and the modification of riparian and channel habitats. One-stage ditches often replace natural headwater streams. When a one-stage ditch is left unmanaged, a stable bench can develop inside the ditch presented more natural features. These naturalized two-stage ditches have the potential to improve ecological functions by creating and maintaining better aquatic habitat, and improve water-quality by encouraging nutrient assimilation.

Objectives: The objective of this project is to investigate the potential of nitrogen removal in one-stage and two-stage agricultural drainage ditches through denitrification. By removing nitrate permanently from the water, denitrification helps offset the negative effects of nitrogen enrichment in aquatic systems. Denitrification could be a significant mechanism for nitrogen removal in agricultural drainage ditches, particularly in the headwater area of watershed.

Methods: Ten one-stage and ten two-stage ditches have been sampled in the summer 2003 to estimate denitrification potential. Sediment samples were taken along 3 transects per ditch. At each transect, samples were taken in the channel and along the slope. Sediment samples were incubated in the lab under different environment to access denitrification potential.

Partnerships: This project started in 2003, in collaboration with the Department of Food, Agricultural and Biological Engineering at Ohio State University and the Water Quality Lab at Heidelberg College.

Research: This project on denitrification and ditch currently support one graduate student (Kelly Powell) and one undergraduate student (Aaron Friend). Kelly is working on her Master thesis, while Aaron is gaining research experience for his BS degree in Natural Resources. We anticipate that the results from this research will be shared through local, regional and national meetings.

Resources: Both students are supported by the project, while Virginie Bouchard is working on this project without direct salary being provided.

Results: Preliminary results from the summer 2003 sampling indicate a wide distribution of denitrification potential across the sites. Potential for denitrification appeared to be increased with the presence of a bench in a ditch.



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