

Uptake and Transformation of Nitrate in Agricultural Tailwater Wetlands, Weld County, Colorado

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Abstract. Across the world, elevated concentrations of N and other agricultural nutrients degrade freshwater ecosystems through eutrophication and direct toxicity to plants and animals and poses a health threat to humans in many developing and developed nations. Runoff in agriculturally dominated watersheds often contains high levels of nitrogen (N) primarily as ammonia (NH_4^+) and nitrate (NO_3^-) as a result of fertilizer application. In Weld County, Colorado 80 % of irrigation wells and 45 % of domestic wells exceed the U.S. EPA drinking water standard of 10 mg/L for nitrate. Constructed treatment wetlands and riparian buffers have been used to mitigate these problems in many watersheds. I investigated a third ecosystem for potential nitrogen sequestration and transformation. Agricultural tailwater wetlands are wetlands that occur at the edge of agricultural fields with groundwater levels controlled by local and regional irrigation. I investigated the extent to which sequestration in aboveground plant biomass and transformation by microbial denitrification occurred in wetlands and the effect of spatial patterns in soil properties, groundwater dynamics and plant communities. Preliminary results indicate that plant uptake and harvest could remove significantly more N from the system than denitrification alone. These results will inform large scale modeling of groundwater contamination as well as field level management of wetland areas for excess nutrient management.