WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: NY1142

Title: An investigation into the mechanisms controlling storm water quality improvement by a large, stream-outflow wetland draining into Irondequoit Bay, Lake Ontario, New York

Focus Categories: Wetlands, None

Keywords: Irondequoit Creek, Stormwater treatment, Streams, Water quality, Wetlands

Start Date: 03/01/2001

End Date: 02/28/2002

Federal Funds: $13,500

Non-Federal Matching Funds: $16,990

Congressional District: 26

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Abstract

Problem: Wetlands are now acknowledged, and utilized, as a natural, powerful mechanism for reducing NPS because of their ability to filter out sediments, trace metals, and nutrients from storm water runoff before these contaminants can enter streams and lakes. New York is unusual in having five or more large, 100+ acre, wetlands strategically located along the mouths of rivers and lakes and cumulatively draining more than one thousand square kilometers of watersheds of the Finger Lakes and Lake Ontario. Relatively little is actually known about how any large wetlands, greater than 30 ha, interact with stream surface waters to reduce contaminants. It is uncertain whether sedimentation, groundwater dilution, wetland transformation, or some other process is responsible for the improvements in water quality. Do these processes change seasonally, among years, or as regional hydrologic conditions become more extreme? Can their wetland functions be impaired with chronic or pulse loading of contaminants?

Objectives: Our previous efforts looked at seasonal patterns in wetland-stream interactions by monitoring a network of two stream gauges and seven stations, each consisting of a water table well, three nested piezometers, and floating boardwalks, all established in June, 1999. This work suggests that the stream-wetland interactions are not constant through time. The proposed work will concentrate on a shorter time scale, to examine how daily factors identified in the first study, including precipitation events, cattail plant evapo-transpiration, and over-bank flood events, are affecting wetland filtering processes. The broader goal is to investigate these short-term processes and then place them in the context of the documented seasonal and interannual patterns for an overall understanding of how the Irondequoit Creek wetland functions in surface water quality improvement.

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Intensive sampling also will be made of the water table fluctuations and porewater redox conditions at hourly intervals in association with the daily pattern of evapotranspiration from the cattail stands. The evapotranspiration monitoring will be done at biweekly intervals throughout the growing season and into early fall to capture changes associated with growth and senescence of the cattails. At each sampling time, measurements will be made hourly, from pre-dawn through early nightfall to capture the diurnal cycle. Water table levels will be monitored within the existing wells and piezometers. Evapotranspiration rates will be monitored using a Li-Cor photosynthesis meter. Plant biomass and heights over the course of the study will be monitored in replicate quadrats associated with each station.

All water samples collected from the surface water, wells and porewater samplers will be analyzed for pH and conductivity in the field. Samples will be collected, filtered, and stored on ice for later analysis of total dissolved nitrogen and phosphorus, nitrate and nitrite, orthophosphate, selected cations and trace metals.