HYDROLOGIC AND WATER-QUALITY CHARACTERIZATION AND MODELING OF THE ONONDAGA LAKE BASIN

Project Description: The purpose of this project is to develop a precipitation-runoff model of the Onondaga Lake basin to simulate hydrologic processes and the transport of phosphorus and nitrogen loads from the various land types to Onondaga Lake. This model will be used (1) to assist water-resources managers in making decisions regarding the selection and location of mitigative measures to maximize load reductions for a given effort, and (2) to provide continuous time series of flows and loads for input to a model of Onondaga Lake. A concurrent study is underway to characterize the water quality at 23 stream sites, which drain areas dominated by the different land types in the basin. The analyses of water samples from these sites will provide basin-specific water-chemistry data that is specific to the Onondaga Lake basin and which will be incorporated into the precipitation-runoff model.

Location: The project area is the entire Onondaga Lake basin, including the major subbasins of Onondaga Creek, Ninemile Creek, Ley Creek, Harbor Brook, and other smaller tributaries to Onondaga Lake.

Project Sponsor: Onondaga County serves as the non-Federal sponsor of this Onondaga Lake Partnership project, and the U.S. Army Corps of Engineers serves as the Federal sponsor. Development of the model is the responsibility of the U.S. Geological Survey (USGS).

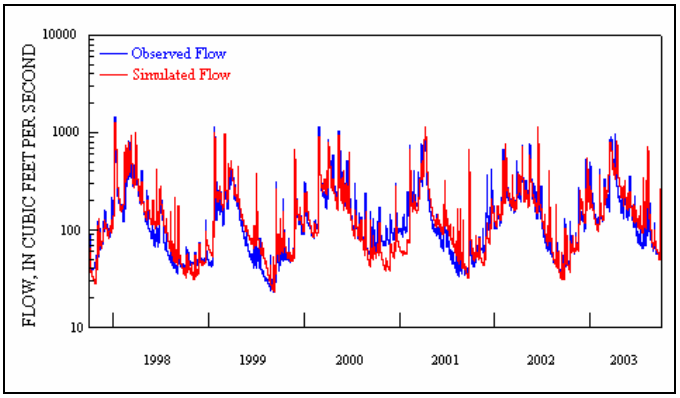

Figure 1 - Observed and Simulated Daily Flow at U.S. Geological Survey Flow-monitoring Station on Onondaga Creek at Spencer Street in Syracuse, N.Y.

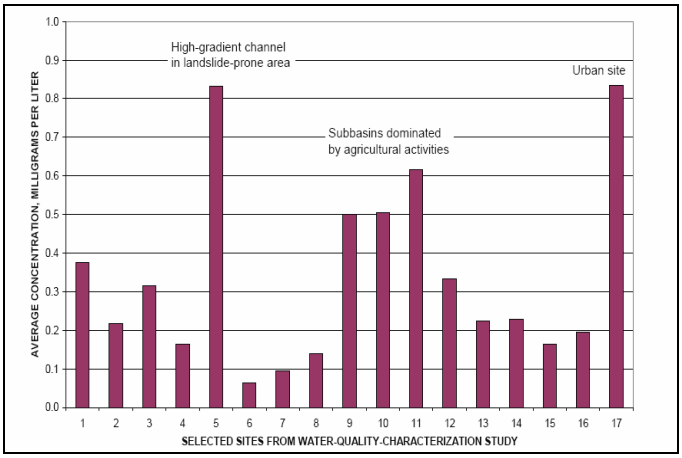

Figure 2 - Average Total-phosphorus Concentrations at 17 Selected Sites Included in the Water Quality Characterization Study, Onondaga Lake Basin, Onondaga County, N.Y

Current Status: The Onondaga Lake Basin was divided into 106 subbasins, which were further divided on the basis of land use, land cover, and hydrologic soil groups into 19 hydrologic response units (HRUs). Precipitation quantities from one of three recording stations plus additional meteorological data were targeted to the HRUs, and runoff and associated chemical loads from these land surfaces were simulated and routed to and between stream channels that ultimately discharge to Onondaga Lake. The precipitation-runoff model was set up and calibrated to flows and water quality data recorded at seven USGS flow-monitoring and Onondaga County water quality monitoring stations. Simulated parameters included flow (Figure 1), water temperature, sediment, orthophosphate, total phosphorus, organic nitrogen, and nitrate.

The concurrent water quality characterization study is half completed as of April 2007. Concentrations of orthophosphate, total phosphorus (Figure 2), ammonia, organic nitrogen, nitrate, and sediment have been analyzed at the 23 monitoring sites for baseflows and storm flows during all seasons of the year. Additionally, four spring discharges are sampled semi-annually and a comparison study between sediment and total suspended solids concentrations at four Onondaga County monitoring sites is ongoing.